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Recycling in the Oil Burner Industry

How History Repeats Itself in the Selling Methods Used. Service the Crux of the Problem Now as Then

By M. A. *Fesler*

THIS human-interest story was written for THE HEATING AND VENTILATING MAGAZINE *by one who might aptly be called "the dean of oil burner engineers." Literally, thousands of burners designed by Mr. Fesler were in use before the advent of many of the now popular burners, and his observations are drawn from an experience both rich and extensive.*

AFTER twenty-six years of research, development, manufacture and sale of oil-burning equipment, it is astonishing to find many of the old, antiquated, and discarded methods resurrected, given new titles or coined phrases and readily palmed off on the public as comparatively new discoveries. This proves the truth of Barnum's classic: "The public likes to be fooled." Yet it seems that only through practical experience and the process of comparison will the public learn the true definition of the much misused term "oil burner."

A survey of the field indicates that many of the present methods of introducing burners in various localities differ little from those of early days, although somewhat refined, and involving greater sums of money, principally due to the increased national prosperity. The plan usually was as follows:

EARLY METHOD OF INTRODUCING OIL BURNERS

A representative of an alleged manufacturer would visit a town, generally a county seat, rent a vacant store, set up a stove or furnace and install his "demonstrating burner." As every town has its quota of retired idlers who congregate through curiosity to see and discuss the new marvel, from these well-meaning old folks the agent would soon learn of the most favorable prospective victim. Gradually, by the process of elimination, the result was that the one finally selected as a local distributor was a young man, born and reared in the town, married, anxious to prosper, and having a few hundreds or a few thousands of dollars, good credit and a wide acquaintance.

With the price of coal prohibitive, wood scarce and expensive, the question of sales was of no serious concern. The manufacturer of the burner, of course, realized this and considered the exclusive sales franchise so valuable that he did not expect to find anyone to offer to purchase it at anywhere approaching its value. But in order to secure the services of a trustworthy local representative to handle local distribution the manufacturer might consider the selected victim's application as manager if satisfactory references were furnished, which were usually regarded only in the light of the amount of money the prospect might invest. At this point the factory representative would undertake to induce the company to

take the victim in as a part owner in the local franchise. Of course, he would handle all finances.

He was flattered. He was to conduct the business, draw a liberal salary and share in the profits. A plan of procedure was outlined by the company and the estimated requirements of burners for the first six months or year were determined. A liberal deposit was forwarded with the order, sight draft to accompany bill of lading to cover the balance of the first shipment. Circulars were ordered printed, advertisements inserted in the local papers and orders solicited. Frequently numerous orders were booked prior to the final closing of negotiations.

In due course about a ton of castings would arrive. The invoice accompanying the bill-of-lading has been credited with the manufacturers' share of the price of the burners. The local manager paid the balance.

TROUBLES BEGIN WHEN INSTALLATIONS START

In the meantime it is discovered that the demonstrator does not perform as usual, and after an examination, the smoke pipe and flue are cleaned and the difficulty attributed to improper adjustment. An assistant is employed to conduct demonstrations and take orders, and the manager goes forth to deliver the goods and train an assistant to make installations. Frequently before the tenth burner is installed difficulties have so multiplied that orders for removals are received as fast as sales are made, with the result that the victim loses the money invested and is left a sadder but wiser man.

SOME SELLING METHODS OF TO-DAY BUT LITTLE CHANGED IN PRINCIPLE

Such a scheme as outlined above, with slight modifications, has been repeated in the same towns and cities year after year, but to-day a survey will show that the scheme as practiced and described above has been refined and perfected. Where, formerly, there were hundreds of dollars invested, the sums now aggregate thousands. Franchises are given with an obligation to purchase a quantity of equipment. The principal qualifications exacted from one who wishes to acquire an exclusive franchise is his ability to purchase and pay for a quantity of equipment, which is simply another way of collecting the money in advance without regard for the future welfare of the purchaser, who, too frequently is carried away and sold on the idea that oil burners can be sold and distributed like automobiles, only to find himself hopelessly involved later on with the choice of one of three courses open.

1. Save what is left of the wreck and seek new fields.
2. Refund to the purchasers the moneys collected and quit.
3. Hang on with the hope that by the Blessed Trinity of Chance something will develop whereby the business can be unloaded on someone else.

HOW ASSETS ARE CONVERTED INTO LIABILITIES

The fact that is so frequently ignored is that a manufacturer or distributor of oil burners immediately starts the process of converting their assets into liabilities as soon as sales and installations are made.

Assuming that the manufacturer is honest and knows from practical experience what his obligations are to the purchaser, the purchaser has a right to expect prompt and dependable service to maintain his burner in operating condition. There is no other mechanical appliance used in the household where the consequent damage due to failure is so great. Anyone familiar with the facts knows that when the tenants of a house become accustomed to a uniform heat, the more important it is to avoid sudden changes in temperature, and when this is recognized the question of service will become the most important factor to be considered by the purchaser.

THE BOGEY OF SERVICE

Without a doubt the term service, or free service, has developed the greatest aggregation of liars to be found in any one industry. The manufacturer who sells the distributor on the idea of furnishing free service is a fraud. The dealer who sells, or allows the salesmen to sell, burners on the basis of furnishing free service is a fool. The purchaser who buys on the theory that he will secure free service is encouraging a fraud, as any sane person knows that any and all service must be paid for by those to whom it is rendered. Therefore, the cost, if paid for in advance, must be estimated and added to the price at which the burner is sold or paid for when rendered.

Any so-called oil burner that is not efficient and so designed as to produce more heat at a lower cost than coal should not be considered, and its sale should be discouraged. The development of the motor car has taught the public to appreciate the quality of workmanship and material that must be built in a burner in order to make it a good investment for the householder.

While it is true that many can afford to purchase new models from time to time the majority cannot and it is Mr. Average Man who needs the economy and convenience to be derived from the use of a burner, for the reason that a majority cannot afford to employ outside help to care for the furnace and the task must be done by the members of the household when, during the day, the male members are absent at their business or employment.

MANY PURCHASERS OF PIONEER BURNERS LEFT WITHOUT SERVICE

The most distressing incidents the author can recall pertaining to the industry, are the experiences as related by many who have invested their

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Does Loose Sales Talk Pay?

How the Heating Industry Reacts to the "Bull" in Oil Burner Literature. Much Money Wasted Through Careless Presentation

OIL burners are almost invariably sold through the written or spoken word. An infinitesimal, but increasing, portion of the total sales results from the prospect seeing a burner in operation, and buying what he has seen. We say that the burner has "sold itself." In the main, however, burners are bought because of the spoken or written representations — or misrepresentations—of an agent of the manufacturer.

For this reason every angle of the presentation of the "selling talk" whether it be by word-of-mouth or through the medium of the printed page, demands careful thought and study. The question of ethics is involved, as well as grammatical construction. Psychology enters into every sale, and either the individual arguments of the salesman or the "mass" presentation of the catalog or brochure must constantly evidence this fact.

Above all, honesty should stand in the background, yet ever be obvious.

Complete and emphatic corroboration of the basic idea behind this article is evidenced in this letter from the chief executive of one of the most important oil-burner manufacturers. It was received after this manuscript was in type, in the course of correspondence relative to questionable advertising on the part of an agent, and our correspondent had no knowledge of the preparation of the article.

We have carefully gone over the advertisement of our dealer and agree that that sort of thing is very bad business. Last year, we found ourselves in the position of being forced to make very strong competitive statements in order to offset similar advertising started by other members of the oil burner industry who were using large space in making statements detrimental to our type of burner. We and other manufacturers turning out similar types of machines were simply forced to get into print.

We realized at the time that it was bad business; and we realize now, without any question of doubt, that the net result of the publicity put out last year by other concerns and ourselves, running into large space and money, was negative and not positive. This contradictory campaign befogged the minds of many possible customers, causing them to wonder if any of us had a good burner. Taken as a whole, the resulting business, with all this expenditure of money for "advertising," was undoubtedly less than would have been done had the manufacturers come somewhere near telling the same story about oil burning and left out competitive and even damaging statements with respect to each other.

It is gratifying that such cases as the one just brought to our attention are decreasing in number, and we hope that the time is not far distant when all oil burner advertising will be conducted along sane and ethical lines.

Yours very truly,

THE OIL BURNER SALESMAN SHOULD KNOW HIS BURNER

It is self-evident that a man selling oil burners should be familiar with the capabilities and limitations of the burner he is selling. He should have an accurate conception of the phenomenon of heat as the result of chemical reaction, and of its transfer and utilization in the domestic heating plant. Having this knowledge, he should tell the story of his burner, either orally or through the printed page, in simple words readily understood by the prospect he is trying to reach.

Under no conditions should his statements transcend the truth.

A company manufacturing a reasonably satisfactory burner can sweep over a given territory with high-pressure salesmen and ballyhoo methods, and secure a goodly crop of sales during a season, only to have the flood tide of success turned into an ebb tide of bitter condemnation, costly service and more costly burner removals. The fault rests, not with the deficiencies of the burner, but with the lies of the salesmen.

If the use of this brief word is offensive, it must be remembered that, where a salesman is attempting to "put over" a sale he is not justified in the excuse that it was not a willful mis-statement of fact. In a sale usually involving an amount approximating a thousand dollars, it is the salesman's business to *know* and not to *guess* when he makes a statement involving the ability of the burner he is selling. And, while it may be difficult to control the tongues of hired salesmen, whose livelihood may depend upon glibness of tongue, it should not be difficult for the manufacturer of an oil burner to disseminate forceful literature that does not misrepresent the product.

Current oil-burner literature, taken as a whole, is pretty bad. Exaggeration, mis-statement, the use of coined words requiring reference to a dictionary, where simple every-day words would have told the story—all these things detract from the strength of the story and tend to increase sales resistance, instead of decreasing it.

Frequently, too, we find the writer of oil-burner literature an apparent stranger to the use of the English language. He may attempt to say something and either say it so badly that his meaning is left in doubt, or he may so misuse the King's English that he really says nothing.

Literature such as that described frequently

sows seeds of distrust, for instance, in the mind of a woman who is willing to spend more than she should, in order to get rid of the coal man. With two or more catalogs, each contradicting the others, and claiming, as the "ad" writers have it—"at last, the PERFECT burner"—what sort of favorable impression could any intelligent woman form of the domestic oil burner of today? Each new catalog would but add strength to the idea that "all men are liars."

THE OIL BURNER SALESMAN SHOULD BE A GOOD LIAR

Now, as a matter of fact, every oil-burner salesman *should* be a good liar. The more closely he can come to living up to this specification, the better salesman he will be, the more burners he will sell, and, what is the crux of the whole situation, the more customers will he secure who will be over 100% satisfied. This, *the final satisfaction of the customer*, is the mark of the real salesman, not the bulk of signatures "on the dotted line."

Let us see, now, what sort of a liar a salesman should be. In the first place, he should willfully misrepresent every point on which the purchaser is going to judge the performance of the burner. It is *very* easy to misrepresent, and, strange as it may seem, it is just as easy to understate the case as to exaggerate it. The mania for over-statement that appears to dominate the oil-burner literature is the misdirected result of a desire to make the burner appear superior to competing burners, regardless of the merits of the machine itself. And even the best of the many good burners cannot surmount the obstacle created through this war of adjectives.

Lying is the basis of successful sales, but it *must* be "good" lying. Every mis-statement must be carefully made, so that the burner can reasonably be expected to *exceed the performance promised.* EXCEED, and not be found deficient. Taking mankind as a whole, if a purchaser is promised a certain performance, and the burner fails to make good by one-millionth *of one percent*, it is human nature to protest, whereas, if the purchase surpasses expectations by less than the infinitesimal, the average man radiates joy and goes about telling his friends about it.

Just a year ago an analysis of oil-burner literature was made, and the conclusion reached was that there was hardly a *good* liar in the lot. In fact it is almost safe to say that there is hardly an oil burner made that can overcome the handicaps imposed by the literature describing it. If this condition exists, if the carefully prepared representations that are written and rewritten, revised and worked over, deal lightly with the truth, and garble the story of the functioning of the burner,

TEN thousand words, it is estimated, is required to effect the sale of an oil burner.

The analytical study of oil burner catalogs upon which this article is based would indicate that more words are uselessly used than are effective. If this is true of the carefully prepared catalog, it would appear logical that the less carefully considered and phrased talk of the salesman is even leaner in vital words.

The picture develops into that of a salesman exhibiting a 50% verbal efficiency while trying to convince a prospect that he will get a machine of 100% efficiency.

Perhaps the figure above quoted represents sales by the process of wearing down the powers of resistance of the prospect.

What a pity that the typical salesman, if this figure is an average, does not simplify his story and argument, reduce it to only 5,000 words, and, with the same verbosity, sell TWO burners.

Which is the Pioneer Automatic Oil Burner?

Here are four manufacturers, each claiming to be the first to market an automatic oil burner. The first leads us to infer that it started in the business in 1920. The second makes the same claim and gives the date as 1921. But the third sends us into a tailspin by admitting that all this has been common practice since 1919. The fourth is content to claim priority without naming the date. If an intending purchaser happens to carefully read the four catalogs from which these clippings were taken, what would he think?

the original automatic oil heater, has an unparalleled record of progressive development for the past five years. The reliabil-

In 1921, the long-sought-for machine became an actuality. In it were embodied every principle, every feature that had in mind from the first,—economy, ease of operation, absolute safety, no odor, no smoke, noiseless, automatic control and capable of burning the lower gravity fuel oils.

Six years ago, back in 1919, the first fully developed was offered to the public. The only important changes that have been made were the only changes possible—merely in appearance. All the principles that were adopted in 1919 are being followed today.

It is made by the largest and oldest makers of automatic oil-burners in the world.

then what can be expected of the individual salesman who, in the heat of battle is apt to make any statement or promise that will consummate the sale?

THE OIL BURNER SALESMAN SHOULD BE PAID A SALARY

One of the greatest drawbacks to the development of the oil-burner industry is the practice of employing salesmen on a commission basis. These men are so vitally interested in the problem of getting the deposit check that little questions as to the ability of the burner to make good disappear over the horizon, and the burner is handicapped even before it is installed

TOO frequently we find the writer of oil-burner literature an apparent stranger to the use of the English language. He attempts to say something, and either says it so badly as to leave his meaning in doubt, or so misuses the King's English that he actually says nothing.

Witness: "The ——— burner requires absolutely no assistance from drafts, in fact they play no part in its performance, instead, the chimney drafts are closed, holding all the heat in the furnace or boiler, reducing the stack temperature to virtually nothing, and insures the greatest economy of oil consumption, this superior and exclusive feature permits us to make our extremely low consumption claim."

There is food for thought in the idea that all oil-burner salesmen should be paid salaries, with, perhaps, a bonus paid a year after the sale is made, if it develops into a satisfactory sale, with no "comeback" resulting from misrepresentation by the salesman. Such an arrangement might decrease the number of burners sold, by 10%, but it would eliminate 90% of the sales that turn out to be unsatisfactory. In the end the volume of sales, of course, would be greater.

A COMPANY manufacturing a reasonably good burner can sweep over a given territory with high pressure salesmen and ballyhoo methods and secure a goodly crop of sales during a season, only to have the flood tide of success turned into an ebb tide of bitter condemnation, costly service, and more costly burner removals.

The fault lies not with the defects or limitations of the burner, but with the lies of the salesman, who promised performance that the burner could not reasonably be expected to attain.

Three of the most important oil-burner manufacturers were importuned, a year ago, to delete from their literature certain words and phrases in the interests of a higher standard in oil-burner sales. To the everlasting credit of the three, they have accepted the suggestion, and demonstrated the broadmindedness of leaders of the industry, and the desire to follow only the highest ethics in the development of their business.

As an indication of some of the things that are not needed in oil-burner literature, or in the arguments of salesmen, the following examples are cited and commented upon, not in a spirit of destructive criticism, but merely to make self-evident the fact that such vagaries *defeat their own purposes.*

The criticisms may appear to be too severe, but, looked at from the standpoint of the home-owner, who is contemplating the expenditure of a considerable sum of money on the basis of these statements, the ethics of the case are well defined and admit of no alternative.

No. 6

MEETS ALL INSURANCE RULES AND REGULATIONS

The Oil Burner meets with all the requirements of local and national Insurance Companies, Fire Underwriters and local Fire Marshalls.

14. It Meets Fire Insurance and Safety Requirements.

The Burner is built to comply with all the requirements of the Underwriters.

It is Clean, Reasonable in Price and Absolutely Safe, having been passed under the rigid requirements of the *Insurance Underwriters Laboratories.*

The approval thus given the principle of UNIT-ACTION by the Underwriters' Laboratories is further proof of the efficiency, economy and safety you may expect of in your own home.

has been tested and listed as standard by the Underwriters' Laboratories, a division of the National Board of Fire Underwriters maintained to pass on all devices that may affect fire hazard. This means that is in their opinion entirely safe and non-hazardous.

Sailing Under False Colors

The first three of these clippings certainly appear to convey the impression that the burners are "listed" by the Underwriters. None is. The fourth implies that "listing" by the Underwriters establishes the efficiency and economy of the burner. It is curious how these manufacturers want to go the limit and claim *the ultimate.* There is a vast difference between the idea that the Underwriters opine that tested burners are *"entirely* safe and non-hazardous," and that the tests through which a burner must go to be "listed" are designed to minimize the risk *to the lowest possible point.*

Shades of John Tyndall!

When such exquisite pictures of the fundamentals of the phenomena of heat are painted in words readily understandable by a child, why should such statements be perpetrated? Does either the writer or the reader comprehend what it is all about?

As a congestion of ideas, this radiant collection of words is a gem. Away back in 1863, in a series of lectures before the Royal Institute of Great Britain, John Tyndall, the master-mind of the scientific world, developed the underlying principles of heat in its various forms. In "Heat as a Mode of Motion," unfortunately out of print, these lectures were collected, and such is the vividness of portrayal and the simplicity of speech that even a child can grasp the basic ideas.

HEAT waves travel about the same speed as light waves—186,000 miles per second. Like light, heat can be "radiant" or direct; "refracted" or reflected, or they can also be conducted.

Scientists claim that "radiant" heat is the most valuable; that is, heat within "view" of the flame. A man standing in the sun's rays on a hot day is sunburnt by "radiant" heat.

Consequently a distributed flame produces much more *radiant heat* (the most effective kind) than a concentrated flame, or "jet."

Refracted or "reflected" heat is next best, and to gain the full benefit of the flame a refractory material must be provided to "reflect" the heat into needed areas.

This extract is an excellent illustration of the abuse of coined words. Here is also claimed an *exclusive feature,* although other burners use a venturi tube for atomizing. Picture, too, reaction in the mind of a timid woman when she learns that she is expected to have in operation in her basement "a harnessed tornado—a whirling, twisting stream of compressed air travelling at lightning speed."

TO burn satisfactorily, oil fuel must be atomized and burned in suspension. Until now, "Atomization" has been considered as satisfactory. has gone a step further. They have taken the principle of "Atomization," refined it, and produced "Aireation"—a degree of fineness hitherto thought impossible.

"Aireation" is accomplished by means of the Venturi—an exclusive feature of Oil fuel is forced under pressure through reduced space in the Venturi where it is met by a harnessed tornado—a whirling, twisting stream of compressed air traveling at lightning speed.

Here we have a "coined" word designated as a *principle* of oil burning. This is another example of the intense desire to claim *exclusive* features, that seems to permeate oil burner literature.

UNITACTION is the final perfecting principle of oil fuel burning. The application of this principle to the oil burner is an exclusive achievement. No other burner embodies it.

Here is another extravagant and meaningless coined term. Atomization, as the term is used, cannot be accomplished in any but the "aero" way. If oil is atomized, it *must* be "aerated" or "aeroized"—or whatever it is. Note that this *results* in *absolute* combustion. No modesty whatever. Simply 100%.

Aero-Atomization Means Absolute Combustion

engineers were the first to perfect aero-atomization and to apply it to automatic oil burners. It is the new and positive method of securing perfect combustion of oil that is sweeping the oil burner industry. Aero-atomization is simply the successful compliance with one of the 5 laws of oil burning, the scientific aeration and atomization of the oil fuel **at one operation.**

WHERE did these *scientists* get this ratio? The air (in pounds) required for the combustion of 1 lb. of oil fuel is between 14 and 15.

Secondly, it takes at least 10,000 parts of air to burn cleanly and completely 1 part of oil. (This is the figure scientists agree is conservative—it is not my own).

is successful because it conforms with the fundamental requirements of efficient combustion in the home. It gasifies its fuel prior to ignition, thus avoiding "coke" and soot caused by cool air. It atomizes without pressure, thus meeting the requirements of Fire Underwriters.

This burner "gasifies" its fuel prior to ignition. Four gratis subscriptions to THE HEATING AND VENTILATING MAGAZINE will be given for:

The name of a burner that does not "gasify" its fuel *prior* to ignition.

The best reason why this burner *"thus* avoids 'coke' and soot caused by cool air."

The most lucid proof that a burner thus (using a venturi) atomizing oil accomplishes this result *without using air pressure.*

The reason that "atomizing without pressure" *meets the Underwriters' requirements.*

Much confusion in four lines.

Fuel oil when atomized this way (mixed with air and burned in suspension) delivers the maximum caloric value of the oil to the heating surface of your furnace or boiler.

In order to secure the highest degree of combustion, it is necessary to artificially *form* a mixture of the oil and air.

It banishes soot, and smoke—NOT because it uses OIL FOR FUEL, but because it CREATES COMPLETE COMBUSTION of its oil fuel.

"The most advanced engineers and professors of chemistry admit our claim to the **highest attainment of combustion** in any oil burner.

In many oil burners, you will notice a roar and surging of the flame. In the [illegible] Burner this has been reduced to a minimum by completely eliminating excessive air. Regardless of how hard the burner must work, only the necessary amount of air to insure perfect combustion is admitted.

for example, uses less oil than all other burners. Dozens of times [illegible]s oil economy has been proved. On this point there can be no question.

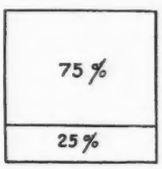
Burners have the lowest cost of operation and the highest production of heat units per gallon of fuel.

Mechanically operated oil burners consume a great deal of oil. The OIL BURNER consumes the least amount of any oil burner.

The [illegible] *is economical.* By its exclusive method of operation every particle of oil is turned into heat in such a manner that your furnace operates at its highest efficiency.

There are a number of oil burning devices which will utilize up to 75% of the oil fed.

The remaining 25% is the difference between Economy and Waste; between Smoke, Soot, Odor, and a Clean, Efficient, Complete Combustion.



This 25%, unburned and wasted, much more than makes up the difference in price between a partial-combustion burner, and the complete combustion HEAT Machine. See letter on page 20.

Oil heat, through the medium of BURNERS will develop over 80% fuel efficiency. They will produce 19,832 British Thermal Units (B.T.U.'s) per pound of oil as compared to only 25% to 30% efficiency of coal, which produces approximately, 10,000 B.T.U.'s per pound.

Smoke and soot are not produced, for the combustion is ***perfect,*** and all the heat in the fuel is produced and utilized. It is quiet—almost noiseless.

Continuous running, automatic in operation. The only successful **generator** burner. It is quiet in operation and well suited for Warm Air installations. Combustion is odorless, complete and quiet. Low fire operation on one quart of oil per hour. High fire capacity, 2½ gallons per hour. Radiation capacity, 2,500 sq. ft. Hot Water.

Some valuable territory still open.

THE **Fuel Oil Burner is the only burner made—which burns low cost fuel oil—and whirls 100% clean heat in maximum volume down against the refractories and thence through the home—NOT up the chimney—and does it all without clattering complicated machinery.**

Many manufacturers do not care to admit that their burners are anything less than 100% efficient. Here, in the first exhibit, is a sample.

Referring to the second clipping, the important fact is omitted as to who are "the most advanced engineers and professors of chemistry" who *admit* the claim of this manufacturer to supremacy. The reputation back of an opinion transcends the value of the opinion itself.

Closely allied with the factor of combustion efficiency is the relative oil economy of the burner. Each, of several, is more economical than the others. "On this point there can be no question."

It certainly would appear indelicate to raise this question in the light of the several claims for as many burners.

No. 3 certainly deserves to be called "exclusive." Everything is complete. Combustion is complete. And how hard the burner must work to show complete combustion *with not a trace of excess air.*

This one is an excellent illustration of the value of lying when selling. The salesman who is a "good" liar makes as close an estimate as he can of the probable fuel consumption, and then tells the customer that it will require a quantity *greater than this amount* by such a safety factor as his experience leads him to adopt. Result: a delighted customer.

The big one with the diagram is interesting. Is it the intention of this manufacturer to cause the reader, and possible customer, to believe that if he buys this particular burner he will have one *33 1/3% more efficient than the best of the other burners?* Is there the slightest chance in the world of being able to make good if challenged on this claim?

The modest claim of only 80% fuel (thermal) efficiency of the next manufacturer is utterly ruined by the context. These five lines *appear* to contain many facts.

"Oil heat . . . will develop over 80% efficiency. *They* will produce 19,832 (*where did this precise figure come from?*) B. T. U.'s . . . as compared to only 25% to 30% efficiency of coal (*that's like comparing dogs and apples*), which produces approximately, 10,000 (*it would be interesting to know the exact figure*) B. T. U.'s per pound." *Now,* do you understand it?

Twenty-five hundred sq. ft. of radiation calls for 375,000 B. T. U. Of course *some* piping is required, with its loss. Yet this marvelous burner will handle it, so the literature says, with its "high fire capacity" of 2½ gals. an hour. The fuel for this "generator" burner contains about 136,000 B. T. U. per gallon, or 340,000 B. T. U. for the hourly ability. With an efficiency of 60%, this would mean some 200,000 B. T. U. available to meet the demand for 375,000 B. T. U. This extract is from a display advertisement in a recent issue of a trade journal devoted to the oil burner industry, and its obvious purpose is to sell burners. Want one? It seems to be about 187% efficient.

This is evidently an inferior burner, as it is only 100% efficient. What a fine idea to have this maximum volume of heat whirled through the home!

Problems in Air Distribution

Field Studies of Air Flow in Typical Buildings, with Comments on Present Tendencies and a Prophecy as to Future Practice. Why Fan Systems Are Not Always Reversible for Winter and Summer Operation

Illustrated with Leaves from an Engineer's Sketchbook.

By Samuel R. Lewis,
Consulting Engineer.

WE hear a good deal of talk about the spectacular picture-theatre cooling jobs, using refrigeration. Nearly every possible point of entry and angle of delivery for fresh air introduction has been tried by some one.

Upward introduction through floor openings under the seats gives draft troubles, unless the entire floor area is occupied, since cool air, pumped up in areas where there is no human body to warm it, falls down the slope and impinges on the backs of people nearer the stage and causes draft complaint.

Overhead introduction from the rear of the audience is always a failure unless the ceiling is very high and unless the incoming air is warmer than in the room.

Downward ventilation, from overhead inlets to floor outlets, possibly would overcome this trouble if we could get enough inlets and if these could deliver the air toward the faces of the people, hitting no bald heads. Such an arrangement physically is impossible for all of the seats in a theatre, and we find as much howling from drafts, due to air entering cooler than that of the room, with downward systems, as with upward systems.

Only a few of the people in a theatre can be served by a consistent air supply from in front of them. To get supply ducts under the balconies at the fronts of the balconies is always very difficult, for structural reasons. The greater part of the audience must be served by air from distant side-wall inlets, necessitating uneven distribution, and with air from the lofty ceiling. This air will not come down unless it is cooler than the air already around the people. In coming down it must dodge the rising currents of air already warmed by the bodies of the people. If it is more than a very small degree cooler than the air already around them, the people will feel it and complain.

The lights, when there are any, add to the complication by warming the incoming air when they are lighted, and by letting it tumble down too cold when they are shut off. A chaotic and inconsistent air circulation and distribution results.

The tendency, at present, seems to be toward using a combination of downward and upward introduction, with some delivery horizontally from side walls. The bugbear is *distribution* of the heavy cold air through a blanket of warmer air in such manner as not to shock anyone, and it is a very difficult problem.

DIFFERENT AIR REQUIREMENTS IN ORCHESTRA AND BALCONY

If anything has been learned about theatre air conditioning it is that the air prescription desirable for the orchestra, for example, is quite likely to be very different from that desirable for the rear of the balcony.

Another lesson learned is that, for any theatre or any cooling plant of material size, we must provide temperature-control facilities for summer as well as winter. This means at least two general kinds of cool air, one much warmer than the other, with mixing dampers, or reheating arrangements, so that some parts of the building will not freeze while others roast.

NOVEL SCHEME PROPOSED FOR CONTROLLING INDIVIDUAL AIR INLETS

I hope, some day, to do a theatre my own way, and the general scheme will be to use inlets under each seat, controlled by the seat, in such manner

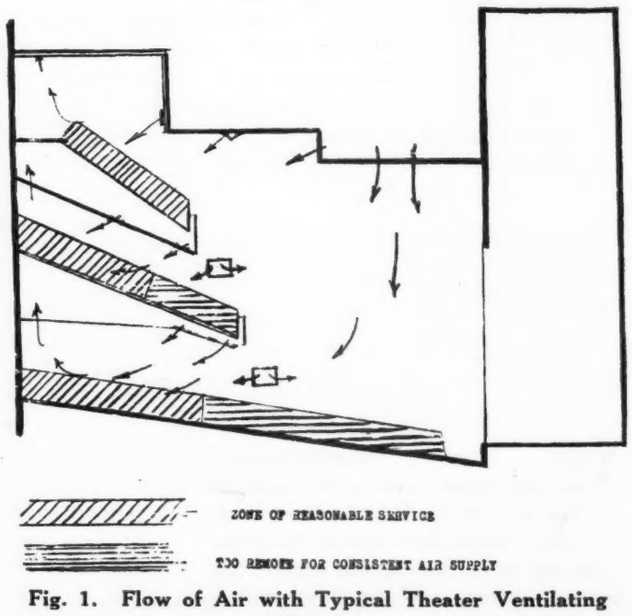


Fig. 1. Flow of Air with Typical Theater Ventilating System

that the seat when raised closes the air supply. Thus the trouble with cool air running down the hill and making drafts in the lower parts of the house will be stopped automatically. The fan speed will be controlled so as to maintain a uniform pressure, being slowed down when the pressure builds up, due to any large percentage of seats being empty. It would probably be necessary to have the closing dampers on only about one-half of the seats.

AN EXPERIENCE WITH REFRIGERATED AIR SUPPLY

I spent many hours last summer in a big room having optimum refrigerated air supply, trying to get the fresh, cool air in without discomfort. I never had a more discouraging experience.

There were many lights, few windows, heavy occupancy. To maintain 70° F. with 90° F. outside, we needed entering air at about 60°. There was no way to get that 60° air into the room without jeopardizing some beautiful stenographer or bucko department head. One trouble was that the men were compelled to wear coats. The girls were bare armed and bare necked.

That cool air was as heavy as lead, sharp as an arrow, and *how* it hated to mix with the warm air of the room! A jet of the miserable stuff, squirting through a keyhole, would hit a person 6 ft. away and make him shiver.

Ceilings in this room were 12 ft. high, with heavy beams between columns about 20 ft. on center. The cool air, when delivered as in winter, horizontally through vertical blade diffusers 8 ft. from the floor (no complaint in winter), would

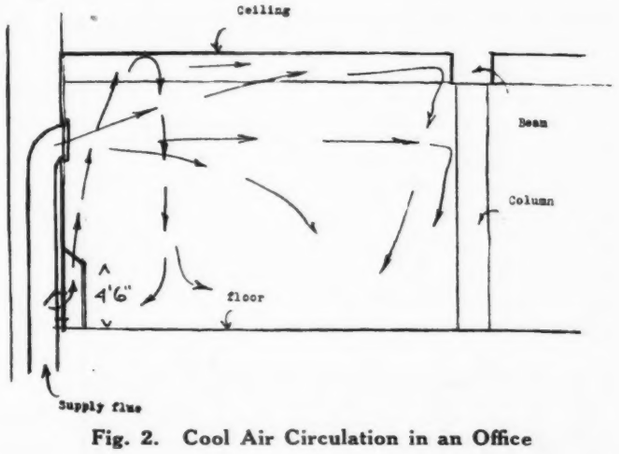


Fig. 2. Cool Air Circulation in an Office

strike against a column 20 or even 40 ft. away and splash, like so much water from a hose, upon the people in that neighborhood.

If diverted to strike against the ceiling, instead of mixing with the warmer air there, as I hoped it would, it spattered out against the beams and then fell to the floor, making drafts easily to be felt and evident by the smoke from punk sticks.

Hoping for a solution, I tried diverting the entering air sideways along the windows, horizontally, at an angle upward, and vertically. I was unable to find any method of diffusion or point of introduction which did not cause complaints from the occupants on account of the cold drafts. Reducing the velocity seemed to have no particular effect until all velocity disappeared. If we just oozed that cold air in, it fell down on the floor and almost rattled as it fell.

The vent flues led to exhaust fans and had been arranged in the original design for vent registers near the floor and near the ceiling. The result of

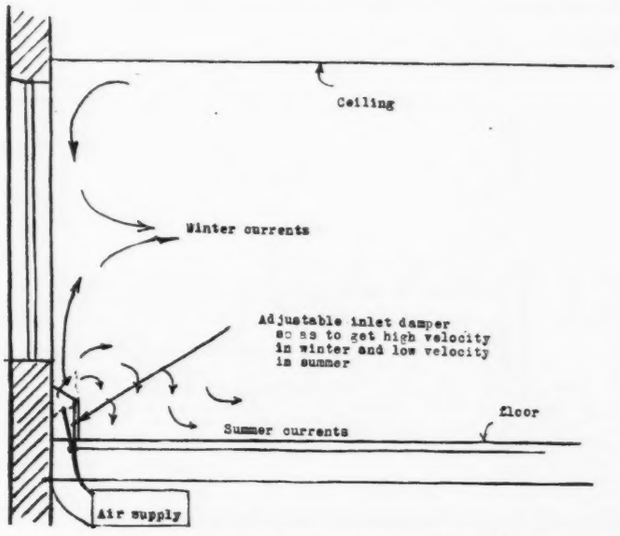

Ceiling
Winter currents
Adjustable inlet damper so as to get high velocity in winter and low velocity in summer
floor
Summer currents
Air supply

Fig. 3. Course of Air Currents in Office Under Winter and Summer Operation

experience in operating in winter is to keep both floor and ceiling registers open, thus reducing the velocity through both. The location of these vents, always close to supply flues, was such that in winter no short circuit or other objection to having the ceiling vents open is encountered. In summer, however, when the entire many-storied building is much cooler than the air outside, how could one expect a thing so weak as a suction fan up in a hot attic to lift the heavy cooler air from the lower stories?

At any rate, I found no draft to speak of through either ceiling or floor vent registers. The exhaust fans simply reduced the pressure in the suction ducts up to their ability, warm air whistled in through the inevitable cracks, and the heavy cold air spilled out through the building leak parts, through doors when opened, elevators, etc., and ran down the stairs like water, little affected by the exhaust fans.

This plant could not use recirculation, there being no return air shaft except the stairways, so that recirculation could be carried on only at night.

The plant in question is one of the most satisfactory winter operating plants we know of. This experience indicates that a plant excellently arranged for winter service may not be best arranged for summer service.

An advantage of upward ventilation when cooling is that the floor and furniture, at least, can be cooler than the air above them, giving a great storage capacity of heat-absorbing material against the peak load.

We worked out a fairly satisfactory arrangement for hot weather, whereby we used steam, which fortunately was available, raising the inlet temperature for the various most drafty supply openings as much as required to reduce the drafts, this being possible because each inlet had its own separate reheater. The air having been washed and cooled, giving off its moisture to the cold water, was warmed without permitting re-entry of moisture, and when we brought it up to 75°, with the room at 80°, no one complained of drafts. The air,

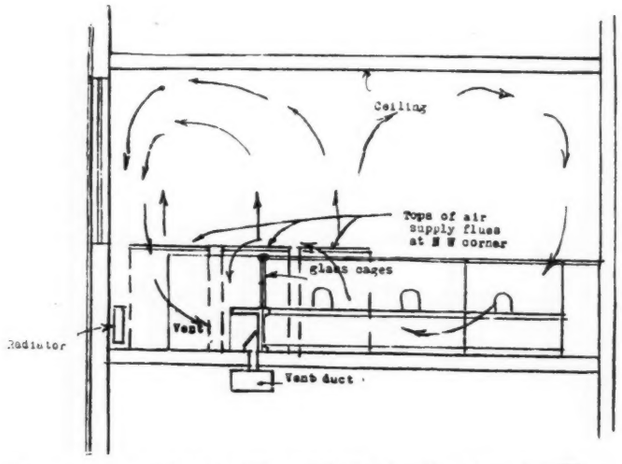


Fig. 4. Cross-Section Through Bank, Showing Air Flow with System as Originally Designed

though not so cool, had great capacity for evaporating perspiration.

I think one lesson from this is, when designing a ventilating plant of any size, always to look out for cooling as well as for heating—the cooling being by far the more important and more difficult problem.

All of this experimenting resulted in the definite conclusion for that office, at least, that it was impracticable to carry an interior temperature more than about 8° cooler than that outside, whatever the outside temperature might be, and that there was no practical physical location of the inlet of feasible inlet speed which would permit comfort in a crowded room with introduction of entering air more than a very few degrees cooler than the air already in the room.

The conventional horizontal discharging register or diffuser 8 ft. from the floor is badly adapted for cool air introduction. The conventional vent opening at the floor is not satisfactory for use with an air cooling ventilating apparatus.

It seems very sure that one should never design a cooling plant using air for carrying away the heat, without providing recirculation arrangements.

HOW THE PROBLEM MIGHT BE SOLVED

I am going to have another chance, one day, at an addition to this office, and I hope I can improve results. I think there will be a perfectly smooth ceiling and that the air will enter the room at very low velocities, looking upward, as far from the ceiling as possible, say in all window stools. I would like a damper at each inlet for regulating inlet velocity. I think there will be little attempt to distribute the vent openings, these being in general at the ceilings toward the centers of the various large rooms, so as to pull the air across the occupied spaces rather positively from the well distributed inlets. In winter we can use a snappy inlet velocity, say up to 500 lin. ft. per minute, using the injector-like effect to pull a certain amount of the room air back across the floor toward the inlet, and depending on the downdraft due to the window chill meeting the entering air to throw it toward the people at about the breathing zone.

In summer the grille openings will be enlarged so as to reduce the velocity and the air quantity will be cut down until we spill the cool air over into the room around its edges at say 100 lin. ft. per minute velocity. This air will roll along the floor, gradually getting warm from the people until it rises to the electric lights, and the warmer stratum at the ceiling will constantly be pulled off to the ceiling vent or recirculating opening.

CONDITIONS IN A METROPOLITAN NATIONAL BANK

There is a metropolitan national bank which built a monumental main room, spending a large sum of money on ornamentation. Presumably, the architect's office maintained a competent heating and ventilating engineer, but in the stress of production the interior finish and architectural effects maintained preponderance over the ventilating, to the extent that the following strange arrangements were made:

Three inlets, each about 8 ft. long and 2 ft. wide, were placed at the northwest corner, dis-

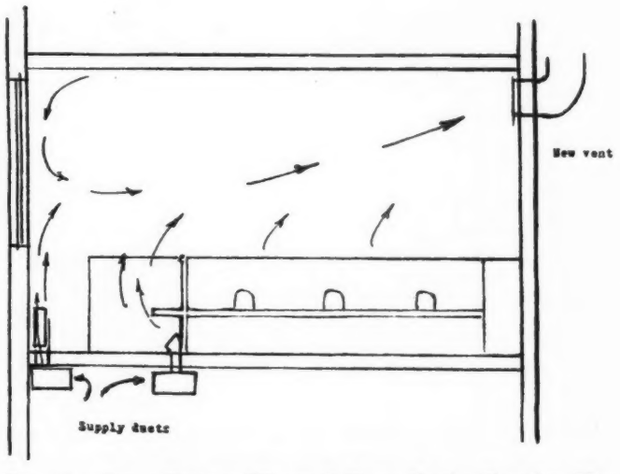


Fig. 5. Cross-Section Through Same Bank, Showing How Remodeled System Changed Air Currents

charging fresh air upward at a level 7 ft. above the floor, toward the ceiling, which is about 30 ft. high. The exhaust was via some twenty odd grilles, each 12 in. x 16 in., placed on a slant under the shelves in the tellers' cages, and connecting via metal ducts to a basement exhaust fan.

(Continued on Page 74)

This is the sixteenth lesson (continued) of The Heating and Ventilating Magazine's

New Home-Study Course in Gravity Steam and Water Heating

Lesson No. 16 (Continued)

By Ara Marcus Daniels

THE STEAM TABLE AND ITS USE

CONTRARY to an impression held by those who have never attempted to use a steam table, a long course of training is not a prerequisite to be able to use it for solving many seemingly difficult problems. The first step is to understand the headings given above each of the columns of figures that together compose the table.

Table S-1-1 represents a condensed steam table. Columns 1 and 2 contain figures that indicate pressures. The pressure at which the steam may be generated or used may be expressed in one of two ways—by gage pressure or by absolute pressure. Gage pressure represents the pressure above atmospheric pressure (unless there is a partial vacuum, when it is expressed as inches of mercury) while absolute pressure includes atmospheric pressure. Thus, the value 14.7 lbs. per square inch from Column 2 is equivalent to 0 lbs. per square inch from Column 1 and absolute pressure for any gage pressure may be found by adding 14.7 to the gage pressure.

Work Problem S-1-9

Water when heated in an open vessel will boil at a temperature of 212° F. when the pressure is atmospheric or 14.7 lbs. Thus steam, under atmospheric pressure, has a temperature of 212° F. as shown by Column 3.

Work Problem S-1-10

If the temperature of 1 lb. of water is raised from 32° F. to 212° F. in an open vessel, a definite number of heat units will have been put into the pound of water. Column 4, Heat of the Liquid, shows this quantity under various conditions of pressure. Thus, at 14.7 lbs. per square inch, temperature 212° F., the B.T.U. in the liquid (water) is 180 B.T.U.

Work Problem S-1-11, S-1-12

When 1 lb. of water at a given pressure is converted into steam, a definite quantity of heat is required. This quantity of heat causes change in state without increase in temperature. It is called the Latent Heat of Evaporization. Its value depends upon the pressure under which the change of state occurs. Thus, for atmospheric pressure, the latent heat of evaporization by Column 5 is 970.4 B.T.U. (This is slightly different from that given in Part 1, Lesson 1, the values having been taken from different steam tables. Henceforth, the value from Table S-1-1 should be used).

Work Problem S-1-13

One pound of water at 32° F., if converted into steam at a definite pressure, will contain a definite amount of heat which is indicated in Column 6 as Total Heat of the Steam. It consists of the heat of

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the liquid, added to the latent heat of evaporization, or the sum of Columns 4 and 5.

Work Problem S-1-14

A pound of steam, at different pressures, will have different volumes. Specific volume, Column 7, represents the volume in cubic feet that a pound of steam will occupy at a given pressure. Thus, at atmospheric pressure, every pound of steam generated, will have a volume of 26.79 cu. ft.

Work Problem S-1-15

Similarly, every cubic foot of steam will have a definite weight depending upon its pressure. Specific density therefore designates, weight (in pounds) per unit volume (cu. ft.) and by Column 8, the specific density, or weight of 1 cu. ft. of steam at atmospheric pressure is 0.03732 lbs.

Work Problem S-1-16

When steam and water or steam, water and air are mixed at different temperatures, and the problem of determining the final temperature and condition of the mixture is presented, the steam table must be called into play.

Since the steam in whole or in part, during the mixing process, experiences a change of state, three conditions must be considered: (a) all the steam may be condensed and the water therefrom cooled; (b) only condensation of all the steam may occur; (c) only part of the steam may be condensed.

The amount of heat given off by dry saturated steam for each of the three conditions may be determined as follows:

For condition (a):

First: Note the temperature of the steam corresponding to the pressure at which the steam is condensed.

Second: Note the temperature of the water to which the condensed steam is lowered.

Third: Subtract result Second from result First and note the temperature difference.

Fourth: Multiply result Third by the correct value for the specific heat of water.

Fifth: Note the latent heat of steam corresponding to the temperature under First.

Sixth: Add results Fourth and Fifth and obtain a value for the amount of heat, given off per pound of steam.

Work Problem S-1-17

For condition (b):

The heat given off will be equal to the latent heat of evaporization for the given pressure and the temperature of the mixture will be that corresponding to the pressure.

TABLE S-1-1
PROPERTIES OF SATURATED STEAM
(CONDENSED MARKS AND DAVIS)

VACUUM INS. OF MERCURY OR LBS. GAGE	PRES. ABS. LBS. PER SQ. IN.	TEMP. DEG. F.	HEAT OF THE LIQUID	LATENT HEAT OF EVAP.	TOTAL HEAT OF THE STEAM	SP. VOL. CU. FT. PER LB.	SP. DEN. LBS PER CU. FT.
1	2	3	4	5	6	7	8
29.74	0.0886	32	0.00	1073.4	1073.4	3294	0.000304
29.67	0.1217	40	8.05	1068.9	1076.9	2438	0.000410
29.56	0.1780	50	18.08	1063.3	1081.4	1702	0.000587
29.40	0.2562	60	28.08	1057.8	1085.9	1208	0.000828
29.18	0.3626	70	38.06	1052.3	1090.3	871	0.001148
28.89	0.505	80	48.03	1046.7	1094.8	636.8	0.001570
28.50	0.696	90	58.00	1041.2	1099.2	469.3	0.002131
28.00	0.946	100	67.97	1035.6	1103.6	350.8	0.002851
27.88	1	101.83	69.8	1034.6	1104.4	333.0	0.00300
25.85	2	126.15	94.0	1021.0	1115.0	173.5	0.00576
23.81	3	141.52	109.4	1012.3	1121.6	118.5	0.00845
21.78	4	153.01	120.9	1005.7	1126.5	90.5	0.01107
19.74	5	162.28	130.1	1000.3	1130.5	73.33	0.01364
17.70	6	170.06	137.9	995.8	1133.7	61.89	0.01616
15.67	7	176.85	144.7	991.8	1136.5	53.56	0.01867
13.63	8	182.86	150.8	988.2	1139.0	47.27	0.02115
11.60	9	188.27	156.2	985.0	1141.1	42.36	0.02361
9.56	10	193.22	161.1	982.0	1143.1	38.38	0.02606
7.52	11	197.75	165.7	979.2	1144.9	35.10	0.02849
5.49	12	201.96	169.9	976.6	1146.5	32.36	0.03090
3.45	13	205.87	173.8	974.2	1148.0	30.03	0.03330
1.42	14	209.55	177.5	971.9	1149.4	28.02	0.03569
0.00	14.70	212.0	180.0	970.4	1150.4	26.79	0.03732
0.3	15	213.0	181.0	969.7	1150.7	26.27	0.03806
1.3	16	216.3	184.4	967.6	1152.0	24.79	0.04042
2.3	17	219.4	187.5	965.6	1153.1	23.38	0.04277
3.3	18	222.4	190.5	963.7	1154.2	22.16	0.04512
4.3	19	225.2	193.4	961.8	1155.2	21.07	0.04746
5.3	20	228.0	196.1	960.0	1156.2	20.08	0.04980
6.3	21	230.6	198.8	958.3	1157.1	19.18	0.05213
7.3	22	233.1	201.3	956.7	1158.0	18.37	0.05445
8.3	23	235.5	203.8	955.1	1158.8	17.62	0.05676
9.3	24	237.8	206.1	953.5	1159.6	16.93	0.05907
10.3	25	240.1	208.4	952.0	1160.4	16.30	0.0614
11.3	26	242.2	210.6	950.6	1161.2	15.72	0.0636
12.3	27	244.4	212.7	949.2	1161.9	15.18	0.0659
13.3	28	246.4	214.8	947.8	1162.6	14.67	0.0682
14.3	29	248.4	216.8	946.4	1163.2	14.19	0.0705
15.3	30	250.3	218.8	945.1	1163.9	13.74	0.0728
16.3	31	252.2	220.7	943.8	1164.5	13.32	0.0751
17.3	32	254.1	222.6	942.5	1165.1	12.93	0.0773
18.3	33	255.8	224.4	941.3	1165.7	12.57	0.0795
19.3	34	257.6	226.2	940.1	1166.3	12.22	0.0818
20.3	35	259.3	227.9	938.9	1166.8	11.89	0.0841
21.3	36	261.0	229.6	937.7	1167.3	11.58	0.0863
22.3	37	262.6	231.3	936.6	1167.8	11.29	0.0886

Condensed from "Steam Tables" of Marks and Davis, by permission of the publishers, Longmans, Green and Company.

Work Problem S-1-18

For condition (c):

First: Note the latent heat of steam for the pressure at which condensation occurs.

Second: Multiply result First by the proportionate amount of steam condensed expressed as a decimal and obtain a value for the amount of heat given off per pound.

Work Problem S-1-19

The above three examples relate only to condensation of steam. When mixtures are encountered, the problem is somewhat different. The heat available for use will not be as great as the total heat given up by the steam.

To find the final temperature and condition of a mixture of ice, water and steam, when mixture takes place at atmospheric pressure, proceed as follows:

First: Multiply temperature rise of ice by specific heat of ice and obtain the B.T.U. required to raise 1 lb. of ice to its melting point.

Second: Multiply result First by weight of ice in the mixture.

Third: Multiply weight of ice by Latent Heat of Fusion for ice and obtain B.T.U. required to change the ice to water at 32° F.

Fourth: Add results Second and Third and obtain total B.T.U. necessary to change all ice at its original temperature to water at 32° F.

Fifth: Subtract 32° F. from the temperature of the water of the mixture.

Sixth: Multiply result Fifth by original weight of water and obtain a value for heat given up by the original water in lowering its temperature to 32° F.

Seventh: Multiply the total heat in 1 lb. of steam at atmospheric pressure (from steam table) by the pounds of steam in the mixture and obtain total heat available from the steam.

Eighth: Add results Sixth and Seventh and obtain total heat given up by water and steam if lowered to 32° F.

Ninth: Subtract result Fourth from result Eighth and obtain the net heat available for use.

Tenth: Divide result Ninth by total combined weight of ice, water, and steam, and obtain the number of degrees that the net available heat will raise the mixture.

Eleventh: To result Tenth, add 32° F. and obtain the final temperature of the mixture.

Twelfth: If result Eleventh is lower than the temperature of the boiling point corresponding to the pressure, at which the mixture took place, this indicates that all the steam was condensed.

Work Problem S-1-20

To find the final temperature and condition of a mixture of ice, water, air and steam, when mixture takes place at a pressure greater than atmospheric pressure.

First: Multiply temperature rise of ice by specific heat of ice and obtain the B.T.U. required to raise 1 lb. of ice to its melting point.

Second: Multiply result First by weight of ice in the mixture.

Third: Multiply weight of ice by latent heat of fusion for ice.

Fourth: Add results Second and Third and obtain total B.T.U. necessary to change all the ice at its original temperature to water at 32° F.

Fifth: Subtract 32° F. from the temperature of the water of the mixture and multiply remainder by original weight of water of the mixture and obtain a value for heat given up by water in lowering its temperature to 32° F.

Sixth: Subtract 32° F. from the temperature of the air of the mixture and multiply remainder by specific heat of air.

Seventh: Multiply result Sixth by weight of air of the mixture and obtain a value for heat given up by air in lowering its temperature to 32° F.

Eighth: Multiply total heat in 1 lb. of dry saturated steam at the stated steam pressure by the pounds of steam in the mixture and obtain a value for the total heat available from the steam.

Note: If steam is not dry but contains a percentage of moisture, the Eighth step should be modified by using, in place of the total heat in 1 lb. of dry steam, the following: The product of the latent heat by the per cent of dryness increased by the heat of the liquid as for a 3% moisture and steam at 20 lbs. absolute pressure, $196.1 + 0.97 \times 960.0$, and this sum multiplied by the pounds of steam in the mixture.

Ninth: Add results Fifth, Seventh and Eighth and obtain the total heat available from air, water and steam.

Tenth: Subtract result Fourth from result Ninth and obtain net heat available.

Eleventh: Subtract 32° F. from the temperature of the steam corresponding to the pressure and multiply remainder by the specific heat of air.

Twelfth: Multiply result Eleventh by weight of air in the mixture and obtain the heat required to raise the air to the temperature corresponding to the steam pressure.

Thirteenth: Subtract result Twelfth from result Tenth and get the heat available to raise the temperature of the water.

Fourteenth: Multiply the heat in the liquid corresponding to the steam pressure from steam table by the combined weight of steam, ice and water and obtain the heat required to raise all the water of the mixture to the temperature corresponding to the steam pressure.

Fifteenth: Subtract result Fourteenth from result Thirteenth and obtain the heat available to evaporate water.

Sixteenth: Divide result Fifteenth by the latent heat of steam corresponding to the temperature and obtain the pounds of dry steam remaining uncondensed.

Seventeenth: Subtract result Sixteenth from the total weight of water in the mixture and obtain the net pounds of water in the final mixture.

Eighteenth: Record the amount of each substance in the mixture and its final temperature.

Work Problem S-1-21, S-1-22

The next lesson to appear next month will contain a classification of gravity steam heating systems, with each system illustrated, and the flow of steam in pipes illustrating the use of formulae, charts, and tables.

The Development of Domestic Oil Burners from Industrial Types

How and Why the West Coast Manufacturers Build House-Heating Machines Closely Resembling Commercial Burners, but with Automatic Control

By S. D. Rickard

This article was prepared for THE HEATING AND VENTILATING MAGAZINE *by a combustion engineer who has had nearly twenty years of experience in the oil-burner field. His first application of an oil burner to a heating boiler was made sixteen years ago in Denver, and the little stories of specific happenings that are told in this and a following issue are drawn from personal experiences.*

THE superior efficiency figures that may be developed in domestic heating through the use of oil fuel, rather than coal, are the result of several factors. A consideration of these items will be of interest, particularly when it is noted that the optimum figures have been obtained with burners of a type similar to the "guns" that fire the huge marine boilers on some of the largest ships afloat. Several makes of domestic oil-burners follow, with more or less fidelity, the practice in the industrial or commercial world, now approaching perfection. When one considers that authentic tests on boilers of comparatively small size (150 builders' rated horse power) have shown efficiencies of practically 86%, and ability to supply steam for twice the rated capacity of the boiler at this high figure, it is no wonder that the development of this type and the details and factors of operation demand attention.

ATOMIZING BURNERS RULE THE INDUSTRIAL AND MARINE FIELDS

Practically all burners for marine and industrial use are of the so-called atomizing type. This word "atomizing" is a more or less incorrect term, although usage through the recent period of oil-burner development has practically given it a place in the dictionary. An atomizing-type oil-burner discharges the oil into the fire-box or combustion chamber in the form of a very finely-divided fog-like spray. In some cases this atomized oil is so fine that it will float for hours suspended in air.

There are many methods used for atomizing oil, each with advantages and drawbacks. Likewise, there are different methods of supplying the necessary air for combustion, and of properly regulating it. Again, even if the oil be thoroughly atomized and supplied with the proper amount of air, the efficiency of combustion may depend largely upon detail of the manner in which the oil-fog and air are mixed.

The result that is desired is the evaporation of the greatest possible number of gallons of water per gallon of oil burned, with the least attention to the burner, minimum expense for repairs, and lowest possible power consumption.

A short survey of the history of burning oil fuels and of the methods developed for atomizing oil will lead to an appreciation of these matters.

THE BEGINNING OF ATOMIZING OIL BURNERS

Probably the first practical atomizing-type oil-burner was developed about twenty years ago in the oil fields, for firing the boilers used in drilling operations. It was simply constructed, of a ¼-in. pipe inside of a ¾-in. pipe, as shown in Fig. 1. A steam line was run from the take-off of the boiler to the ¾-in. connection, and the oil was supplied

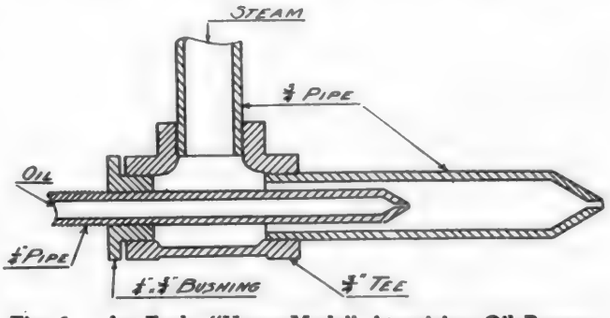


Fig. 1. An Early "Home-Made" Atomizing Oil Burner, Fabricated from Pipe Fittings

either by gravity or pump pressure to the ¼-in. connection. The steam and oil are discharged through the tip of the burner in an emulsified state, and the steam, discharging into the atmosphere, rapidly expands, breaking the oil into a mist of countless small drops.

Air for combustion is drawn in by the natural draft of the stack through a checker-work of fire-brick below the burner. This method of atomizing

oil has grown in favor until to-day we have many burners using the same method, but differently applied, such as the "outside mixing" burner, shown in Fig. 2, and the "inside mixing" burner, shown in Fig. No. 3.

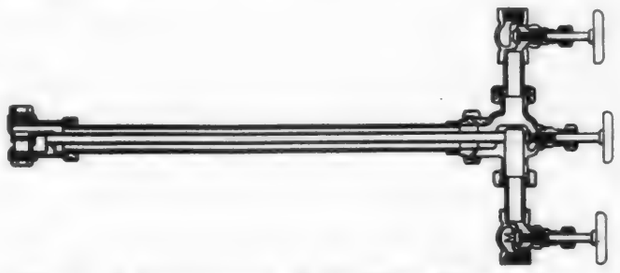


Fig. 2. A Development of the "Pipe Fitting" Burner, Known as an "Outside Mixing" Burner

This general type of oil-burner has held favor for many years because it is cheap in first cost and, when the oil-burning system behind it and the furnace in front of it are correctly designed, it is very reliable. One disadvantage is that only dry, hot steam, or steam under high pressure, can be used. Although there are records of the steam consumption being reduced to nearly 2% of the total steam generated, it is found that, under usual running conditions, 5% to 10% of the steam generated will be consumed.

Many installations of this type of burner were also made in industrial furnaces and ovens used in various manufacturing operations long before the day of the automobile. But, due largely to the difficulty of obtaining hot, dry steam at some distance from the boilers, compressed air was soon substituted for steam with very satisfactory results.

LOW PRESSURE AIR PROVES EFFECTIVE

About the time of the advent of the automobile, where oil has since been used almost exclusively for the operations of forging, hardening, etc., engineers discovered that oil could be just as efficiently burned with compressed air under only 1 to 2 lbs. pressure, as with steam or air under 80 to 125 lbs. pressure.

It takes approximately the same volume of air to burn a gallon of oil regardless of the pressure, and therefore, when it is realized that an efficient blower will deliver 1000 cu. ft. of air per minute at 1½ lbs. pressure when operated with a 7½ H. P. motor, and that an efficient two-stage air compressor, delivering 1000 cu. ft. of air per minute at 125 lbs. pressure will require a 200 H. P. motor, the advantage and economy of the low-pressure system is clearly apparent. A burner that is used extensively in industrial furnace work and atomizes the oil efficiently with an air pressure of 1 to 2 lbs. is shown in Fig. 4.

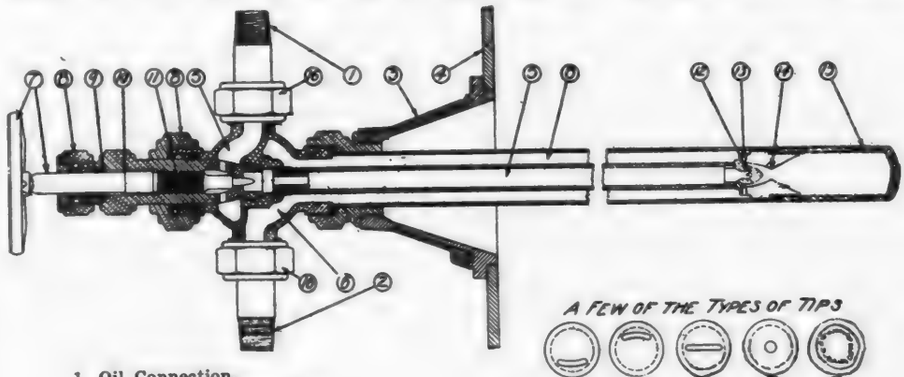
But all of these developments are now ancient history, and it must be appreciated that the economy and advantages realized by manufacturers for many years in the use of fuel oil for firing industrial furnaces and ovens cannot be secured to the same extent in firing domestic and commercial heating boilers.

MECHANICAL ATOMIZING TYPE SUPERSEDES STEAM

The extensive use of fuel-oil aboard ship did not come about until the development of the "mechanical" burner, which supersedes the steam-atomizing type. Steam used in atomizing oil escapes up the stack as simply superheated steam. This loss of fresh water did not materially bother the stationary power-plant operator, but other advantages of oil fuel aboard ship were more than neutralized by the high consumption of fresh water necessary for steam generation. The mechanical type burner now used extensively aboard ship simply depends on a very high oil pressure, and oil temperature to atomize or spray the oil. These high pressures and temperatures and the constant clogging of the fine oil-burner tips with dirty oil all present certain disadvantages. A typical oil burner of the mechanical atomizing type is shown in Fig. 5.

One of the big problems of the manufacturer of mechanical atomizing-type oil burners for firing domestic and commercial heating-boilers has been to reduce the amount of power required to atomize the oil and at the same time maintain efficient atomization.

Years ago the Liquid Fuel Board of the United States Navy published a report covering tests of various types of oil atomizers and was most enthusiastic about a type which atomized the oil by centrifugal force, by throwing the oil off a plate revolving at high speed. Results secured with



1. Oil Connection.
2. Steam or Air Connection.
3. Burner Tuyere.
4. Front Plate.
5. Oil Passage.
6. Steam or Air Passage.
7. Needle Valve.
8. Gland Packing Nut.
9. Bronze Ring.
10. Stem Shoulder.
11. Fine Threads.
12. Orifices for Oil.
13. Orifices for Steam or Air.
14. Venturi Tube.
15. Burner Tip.
16. Union Spud Connections.

A. Slot Down.
B. Slot Up.
C. Slot Center.
D. Round Hole Center.
E. Round Holes near Circumference. Also Many Other Types.

Fig. 3. A Development of the "Pipe Fitting" Burner, Known as an "Inside Mixing" Burner

this burner were most gratifying, but it was frankly admitted that the burner would go to pieces within a few hours and that it was not commercially practical.

PACIFIC COAST ENGINEERS DEVELOP MECHANICAL TYPE

It remained for a number of manufacturers on the Pacific Coast about 12 or 15 years ago to develop burners using this principle of atomization and make them commercially satisfactory. There are now several makes of burners in that district all using a cup revolving at high speed, into which the oil is fed in a small stream, to be atomized by centrifugal force. It is claimed, and a number of elaborate tests appear to substantiate the claim, that any grade of oil can be atomized at less cost for power by this method than by any other known method, and that the heavier grades of oil containing the higher heat values can be atomized as easily as the lighter oils.

Every combustion engineer knows that it requires a certain quantity of air to supply the oxygen to burn a certain quantity of oil. About 1800 cu. ft. of air per gallon of oil or from 14 lbs. to 15 lbs. of air per lb. of oil is the most generally accepted figure. But a great many engineers have not realized the importance and the advantages to be gained in getting this air and oil to mix *quickly*.

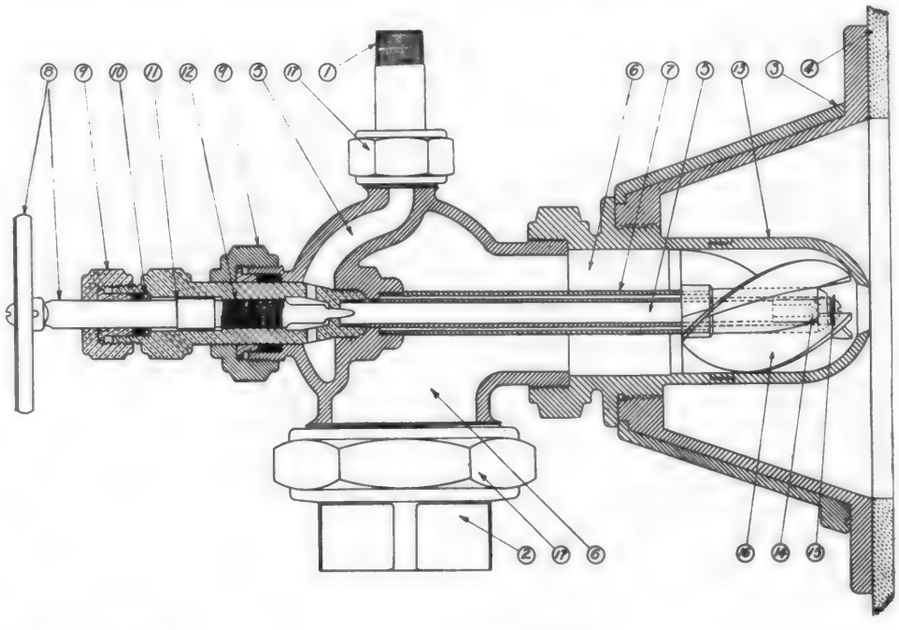
We all know that the burning of oil, or any other material is what might be called a continuous explosion or continuous combustion. The explosion of a charge of T.N.T. is an example of a very rapidly completed process of combustion, whereas the rusting away of a piece of old iron lying out in the weather is an example of very slow combustion. Each example is a case of the combining of (principally) carbon and oxygen resulting in combustion. In the case of T.N.T. the explosion or combustion is completed so rapidly that the heat and noise generated are most distinctly noted, whereas in the case of the piece of iron rusting away both heat and noise are being produced, but the action is so slow that neither can be noted by human faculties. In one case the elements necessary for combustion are able to get together quickly, and in the other case it takes a very long time for a complete mixture to take place.

It is thus apparent that the finer the oil is atomized and the *quicker* the air necessary for complete combustion is mixed with this oil, the shorter the flame will be made, the quicker combustion will take place, the hotter the flame will be.

SHORT FLAME DESIRABLE IN DOMESTIC HEATING BOILERS

One might ask what advantages are gained by a short hot flame. Such a flame is not advantageous in some industrial-furnace operations where slow-burning and long flame travel are best, but for firing any type or make of domestic or commercial heating boiler, power boiler and certain industrial operations, a short, hot flame is most advantageous.

We all know that economy cannot be secured if the stack temperatures are so high as to indicate excessive loss of heat up the stack; if unburned gas or smoke escapes up the stack; or if unburned oil is deposited in the boiler or fire-box in the form of soot or carbon. Excess air, often necessary to hold the spray of oil in suspension until it burns, is often the cause of high oil consumption, although it eliminates soot, carbon and smoke.



1. Oil connection.
2. Air connection.
3. Burner tuyere.
4. Furnace front plate.
5. Oil passage.
6. Air passage.
7. Guard tube.
8. Needle oil control valve.
9. Gland packing nut.
10. Shoulder.
11. Shoulder to prevent turning needle valve all the way out.
12. Very fine needle valve threads.
13. Burner tip.
14. Oil passages.
15. Oil guide plate.
16. Air guide vanes.
17. Union connections.

Fig. 4. A Low-Pressure Atomizing Burner, Widely Used in Industrial Furnace Work

It must be further remembered that as soon as an oil flame touches a cold surface such as the water-jacket or tubes of a boiler, or if the temperature is reduced below a certain point, the flame is extinguished, and the unburned oil leaves the boiler in the form of soot or smoke and sometimes as a colorless unburned gas.

A lighted candle burns with a clean, clear flame. If a cold plate is held over the candle flame, it will at once accumulate a deposit of soot. A candle

is nothing more nor less than an oil burner, and any type of oil burner will do the same thing when the flame comes in contact with a relatively cold boiler surface.

CHANGING BOILER OPERATION BY CHANGING FLAME LENGTH

There is an interesting case on record of a small water-tube boiler in a large restaurant, used to supply steam to the steam tables, and for the hot-water service tank. When the burner was opened up enough to generate sufficient steam, the oil flame licked the water tubes. This deposited so much soot that it was necessary to shut down the burner once a day and clean out the boiler. After much of this trouble, the oil-burner dealer told the owner that it was impossible successfully to fire that particular boiler with any but a burner producing a much *shorter* flame. A new burner was installed and ran continually, 24 hours per day, every day, for over a year, when it was stopped in order to clean the dust out of the fan and to renew the lubricating oil. At that time the boiler tubes were found to be almost as clean as the day the burner was started. And with the short flame a material fuel economy was effected.

In another case where a burner producing a long flame was installed in a large cast-iron sectional heating boiler, the fire-box or combustion chamber below the boiler shell was so large that the long flame did not deposit soot and seemed to be running in a most efficient manner. In fact, it was an ideal condition for this burner and seemed to be satisfactory in every respect. However, with a short flame, an oil saving of about 20% was effected. A test showed that this saving was due to a much lower stack temperature, the use of less excess air, and to the fact that more of the boiler's heat absorption surface was used, due to the shorter flame heating the front sections of the boiler by radiant heat.

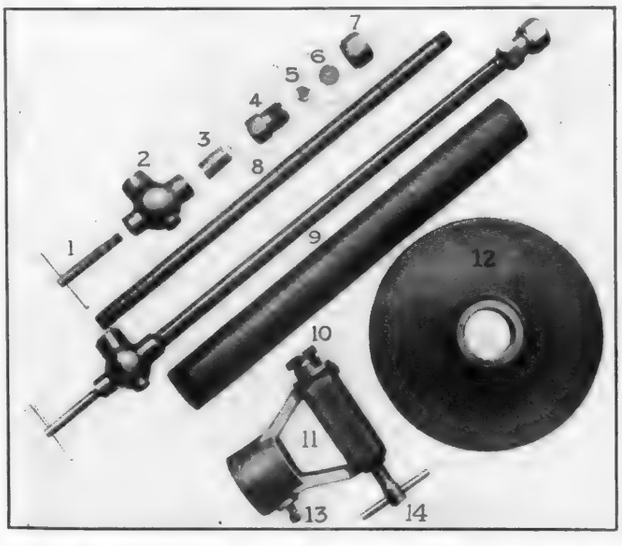


Fig. 5. Essential Parts of Mechanical Atomizing-Type Burner

The above examples, out of hundreds of such experiences, point to the conclusion that a short flame burner will reduce oil consumption or insure a higher overall boiler efficiency, and make it possible to develop more steam without smoke or soot and with a limited fire box volume.

Recycling in the Oil Burner Industry

(Continued from Page 56)

money in the sale and distribution of an oil burner and found after a season or two that their difficulties had so multiplied that they were compelled to abandon the effort and pocket the loss, which is only a part of the tragedy. Most of those who have purchased burners are without service, and in this way thousands of orphan burners are abundant throughout the country, annually requiring replacement by a new burner at great expense or reverting back to coal.

STANDARD INSTALLATION CODE NEEDED

The cause or causes of these unfortunate occurrences can be corrected by mass action on the part of honest manufacturers and dealers, by cooperating with the National Board of Fire Underwriters in establishing a standard code of rules governing the installation of oil burners. This code when compiled should require the unqualified endorsement of municipal and State authorities to the end of abolishing all local ordinances, many of which are a nuisance, and added expense to the purchaser without accomplishing the results for which they were passed.

No oil burner, regardless of design, workmanship, and principle, will function safely or economically unless properly installed.

PURCHASERS NEED ENGINEERING ADVICE ON SELECTION OF BURNERS

For those who contemplate the purchase of an oil burner the following advice is offered. If you are not qualified by training or experience to judge the qualities necessary to make a good burner, consult friends who have,—your heating contractor, or architect, or a heating engineer. Even at the expense of a reasonable fee, it will prove one of the best of investments, second only to the final purchase of a good reliable oil burner which will lighten the burden in the care of a home and earn you a greater return than any other investment. Be sure you don't buy a burner that is destined to be an orphan.

Relations of Engineer to Architect and Owner

By T. W. Reynolds

SO much has been written and said about this matter, mostly partisan in nature and mere propaganda written from the point of view of either engineer or architect, that no attempt will be made to review all phases of the subject. We may be content with touching the high spots only, realizing the liability to a mixture of good and bad in any of the methods proposed. The very fact that there has been so much discussion pro and con in the past should serve to indicate that there is as yet no hard and fast rule governing all cases.

The Three Methods Usually Followed

EDITOR HEATING AND VENTILATING MAGAZINE:

In your experience with the many large buildings with which you are concerned, no doubt you have had a great many opportunities to observe the character of the work done by consulting engineers who specialize in the design of the complete mechanical equipment of buildings.

Ordinarily there are three methods in common use, as follows: First, where the engineer works in the office of the architect; second, where the engineer works on a sub-contract through the architect's office; third where the engineer works on an independent contract direct with the owner.

In analyzing these three methods of handling the mechanical equipment of buildings we should appreciate it if you would write us your opinion as to which of the three methods has proven to render the most satisfactory service.

Chicago. *C. E. A.*

It should be no hard task to make out a strong case for either engineer or architect. Much depends upon the personalities of those involved—engineer, owner or architect, the class of job, and the particular job in mind. Some engineers would prefer to deal direct with the owner, others with the architect, and each of these possibly would have preference in some cases to the contrary, especially were a specific, instead of a general, case before them, or had the name of the architect or owner been given in stating the question.

ADVANTAGE OF DIRECT RELATIONS WITH OWNER

Though this matter is often a job condition, so that theories of practice as between engineer, owner and architect must be generalizations, yet it may be conceded, in an average of all cases, that the engineer would gain more in prestige and that, in many cases, better service would be rendered were the consulting engineer to work directly for the owner, thus allowing him to be free to act in conjunction with the architect for the best interests of his client. This would give to the engineer the same authority for deciding engineering questions as is accorded to other professional men in the decision of matters pertaining to their work.

The charge that the engineer would make excessive and extravagant demands of the owner for space and equipment is entirely without foundation and said with no full realization of present-day practice in healthy business. Even engineering sales companies, who, of anyone, are more in a position to profit directly by overloading a job, almost invariably give advice in regard to the application of their specialties which often enables the engineer to cut the quantity of the specialty used. The competent engineer realizes the limitations of available funds and is by far more qualified than the architect to distinguish between the essential and the non-essential in the mechanical services of a building.

ENGINEER'S INTEREST IN SPECIFIED PRODUCTS

There is also the charge that the engineer may be interested directly or otherwise in some product which he specifies, but such a violation of ethics, if practiced by an engineer, would not be peculiar to engineers. Self interest, pet theories and other ills are not peculiar to professions, but rather to individuals. Thus, we may find interested parties reaching and influencing the architect, owner or owners' representative, doubtless without these parties being aware of it. Where the sales engineer carries his case directly to the owner and succeeds in influencing his judgment as to products specified, it is often necessary for the consulting engineer to submit his case to the owner in a roundabout way through the architect at considerable expenditure of time in correspondence and reports. Short shrift would be made of such cases where the engineer deals direct and has a more personal contact with the owner.

WHERE ENGINEER IS UNDER CONTROL OF ARCHITECT

The principal argument advanced for having the engineer under the control of the architect is

that the owner is thereby relieved of a great deal of responsibility and has only the one party to deal with who is responsible for the full completion and co-ordination of the several branches of the work. However, the owner, by not coming into direct contact with the equipment work, has no assurance of what he is getting or that this branch of the work is receiving proper consideration. He may hear less of disputes and the work may suffer accordingly, differences which practically cease to exist when it is understood that the owner will act as final judge and give each a fair hearing.

OWNERS GENERALLY MEN OF EXPERIENCE

The owner has appropriated a certain sum of money for the entire building project and should act as judge for the proper apportionment of this money to each trade. It may be confusing to some owners to decide rival claims, but most men of means have had experience and realize, in a general way, the character of the service given and the grade of equipment ordinarily used in a building of the proposed type. Owners, as a rule, are capable of perceiving logic, and engineers with sufficient ability should have no trouble in convincing an owner as to the truth of their arguments. More often the owner, having no prejudices, is easier convinced.

The engineer may have no more responsibility under this arrangement than he does when under control of the architect, for the latter, in case of trouble, is apt to shift the whole responsibility for the engineering on the engineer's shoulders. Of course, where the owner is a corporation, the engineer may find it better to work for the architect, for the corporation may contain interested or opinionated individuals with axes to grind on theories, types of systems and products to use. It all goes back to the individual, as previously stated.

NO WORKING AGREEMENT BETWEEN ENGINEERS AND ARCHITECTS

There is no working agreement between engineers and architects whereby each might be confined to their own particular field with better economic results to all. Co-operation in the minds of many means only a friendly interest and avoidance of conflict whenever the interests of the two parties concerned do not conflict. Self-preservation compels the architectural viewpoint to subordinate economy and utility in engineering to the finer points of beauty and arrangement of the building. The result is that the engineering essentials often suffer and have their usefulness impaired, and, in a great many cases, without the architect appreciating this fact.

Perhaps an interior decorator should not work apart from the direction of the architect, else the decorator might spoil the effect of marble and tile by his color scheme. Harmonious effects of the two artists are required and one must conform to the other, but the case of the engineer is different, though it goes without saying that the engineer should co-ordinate his equipment with the building which the architect designs. Unfortunately, this requirement often develops a difference between engineer and architect as to how far utility should be subordinated to beauty.

For example, to the mind of the engineer the class of building may not be marred by the placing of runouts to radiators at the ceiling. In the opinion of the architect these should be concealed, yet when concealed there is often very little room for installation or expansion and the chances of trouble, due to careless workmanship in tight places, is great unless extreme vigilance in supervision is exercised. How far should one give way to the others in cases of this kind? Does the engineer have his way? He does not. Who takes the responsibility of failure? Foolish question, the engineer, of course.

ARCHITECTS' AND ENGINEERS' FEES

Some architects who uphold the rules of their own profession by maintaining their fee do not hesitate to cut the engineers' fee, thus placing at an unfair advantage the other architect who, selecting the best of engineering talent, will neither cut his own fee nor that of the engineer. Again, though an architect is entitled to some percentage of the cost of mechanical equipment for co-relating architectural and engineering plans and specifications and for other duties familiar to all of us, he is not always entitled to the higher percentages which he asks of the owner. The architect's demand for extra large fees on the cost of mechanical equipment has sometimes resulted in the owner separating the architectural and engineering work, paying to the architect and engineer a full fee on the work of each.

SHOULD BUILDING CONSTRUCTION BE IN THE HANDS OF ENGINEERS?

Some engineers contend that the construction of a building is mainly an engineering problem and should be in the hands of an engineer who should retain an architect to add to the structure the desired touches of beauty. This is food for thought. At any rate, the architect plays a less important part in industrial work where strength is more to be desired than beauty of structure.

ENGINEERS IN ARCHITECT'S OFFICES

Coming to the question of engineers working in the office of the architect, it is a fact that a vast amount of architectural work is required to warrant the maintenance of an engineering department. The volume of work in one office only is not sufficient to maintain expensive and high-grade talent.

Engineers temporarily taken on during the rush receive no attention and are left to their own designs, for the office is too busy at such times. As a consequence, the office has no settled policy or established practice in engineering design. Good design develops gradually with the years of experience and records acquired with the office. It should not be free to come and go with the floating talent.

Where an architect maintains an engineering department it is not unusual to find engineering requirements subordinated to the architectural requirements of the chief designer who may be temperamental to the extreme and one so directly in his power as those within the same office is too near home. The unfortunate engineer in this predicament has less chance of influencing the decisions of the chief designer than if he came from the office of some consulting engineer which the architect might otherwise retain.

If anything, it would be reasonable to expect that the architect, in order to maintain his engineering department, should also take in engineering work for buildings on which he does not act in the capacity of architect. This is just another way of proving that the reverse should be the case; that is, the engineer should maintain an architectural department for beautifying the building which he also equips and through this department do architectural work upon buildings with which he has no connection as engineer.

CAUSE OF THE ARCHITECT'S PREDOMINANCE

Architecture is an art developed through the centuries, compared to which the mechanical services of buildings is in its infancy. This accounts for the predominance of the architect, but building equipment, now and for some time, has been developed to the point where the engineering requirements of buildings should be determined entirely by the engineer and without the restraining hand of the architect.

At the present time the engineering requirements of buildings, where not designed by the owners' engineering department, or by the builder or sales engineer for the architect or owner, is usually done by the consulting engineer, under the control of the architect. There is no doubt that such work is done satisfactorily in a great number of cases and that a number of engineers seem content to work this way or else are indifferent to the situation, but the exception to the present practice may become the custom of the future.

The main thing to determine now is not what the engineer or architect thinks of the various methods, but rather what the owner thinks. The engineer working along these lines will solve the problem of his relationship to others quicker than by any other route, as there is a growing tendency for the owner to eliminate all intermediaries and deal direct. Unfortunately, however, in a number of cases the line is so direct that it goes straight from the owner to the builder.

Problems in Air Distribution

(Continued from Page 64)

Apparently, the theory was that since a unit ventilator placed under a window in a school room seems to blow fresh air vertically toward the ceiling without trouble, this supply fan in the basement could get away with the same thing in a banking room 80 ft. x 100 ft. and 30 ft. high. There were good-sized direct radiators under most of the windows.

One winter's operation of this plant brought forth some interesting testimony. Drafts were complained of throughout the room. People in the cages and between them and the outside wall complained of cold.

The radiators had not very much chance to circulate the air within the room, as all of them were down behind a fence caused by the cages, and the circulation air for the radiators had to climb over the fence, and then down to the radiators. On its way down, however, this air was caught by the badly-located vent registers and was pulled out of the room, chilling, as it went, the legs of the clerks in the cages.

The glass area was so great and the direct radiators under the windows were so handicapped in getting air supply that cold air fell down into the space behind the cages despite the radiators. Occasionally, the thermostats would operate, shutting steam off the radiators, especially in moderate weather, and at such times the drafts from the windows were unbearable. Of course, these down drafts from the windows were aggravated or augmented by the fresh air from the ventilating system, which, reacting from its contact with the ceiling, naturally would tend to fall down the Niagara caused by the great windows.

This plant is now in process of rectification. We are changing all the former cage vents to warm air inlets. We are blowing warm air in at high velocity under every direct radiator which comes under a window. We are adding more direct radiation and are changing the vent outlets to large ones at the ceiling on the inner side of the room.

Based on past experience, I believe we will come somewhere near fixing the job, though the duct changes are being made to permit us, if necessary also to introduce warm air on the right-hand side of the cages near the floor.

In a subsequent article Mr. Lewis will tell of interesting methods adopted for improving the appearance of heating equipment in gymnasiums, the trend towards intermittent ventilation, and his impressions of what is to become standard practice for assembly rooms and similar quarters.

The Oil-Burner Ordinance Situation

Present Requirements in Representative Cities, the Desirability of Uniformity and the Logical Outcome

PREFACING a series of articles on the subject of municipal ordinances dealing with the installation of oil-burning equipment, the salient features of the problem involved are here presented.

On the one hand is the question of the desirability of uniformity of regulation, inspection of installations in communities where no inspections are now required, and the possibilities of ultimately reaching a point where an inspection by representatives of the Underwriters will be necessary prior to allowing a burner to be started. The need for such action is apparent, considering the admitted fact that careless or improper installation is responsible for a large part of the annual fire and smoke loss from so-called oil-burner fires.

On the other hand, there is the claim, coming largely from those interested in the sale of burners marketed on a highly competitive price basis, that such inspection costs money, involves unnecessary delays, and has other objectionable features.

Such pertinent points, and a complete tabulated analysis of the ordinances of fifty of the largest cities, where they apply to the installation of oil burners, will be taken up in following articles.

A STUDY of various ordinances governing the installation of domestic oil-burning equipments, and adopted by various cities throughout the country, will indicate a wide difference with respect to various details. This probably is not entirely true of those cities which have adopted ordinances based on the installation requirements of the National Board of Fire Underwriters, but, even in such cases, the requirement relating to permissible amounts of fuel oil to be stored in gravity tanks differs considerably. Some ordinances require a shut-off valve controlled by a fusible link so as to guard against the continued supply of oil to the burner in case of fire within the cellar or other location where the burner may be installed.

Practically all of these ordinances fail to go beyond a requirement for the submittal of plans or the making of an application previous to the issuance of a permit; in other words, the average ordinance now in force simply results in the fire chief or other so-called enforcing official having the installation of equipment brought to his attention. The permit is issued after the payment of a fee and the agreement of the installing company to install the burner in accordance with the city's regulations. As the city does not check up, or, in other words, inspect these equipments before they are placed in use, this control is fancied rather than real.

The troubles that have been experienced throughout the country with oil burners have been largely due to incomplete combustion, in many instances brought about by inadequate draft or stack capacity. A closer study of these causes reveals that the company making the installation did not consider the combustion features involved. This tends to indicate the need of a provision in the average ordinance for consideration of the stack and chimney requirements for individual installations. Failure to do this simply means eventual trouble and this trouble will likely result in spreading smoke and soot throughout the house and calling of the fire department.

The natural tendency of the average municipality is to use the Underwriters' installation requirements as a basis for an oil-burning ordinance.

From the oil-burner man's point of view this is advantageous, as it is a means of obtaining uniform requirements throughout the country. The Underwriters secure their regulations from the National Fire Protection Association, the procedure of which organization permits the regulated industry in question to participate in the framing of regulations affecting it. It is, therefore, only logical that the various oil-burner associations should cooperate with the technical committee of the National Fire Protection Association having these matters in hand so that ordinances resulting from these regulations will not only be of a uniform character but acceptable in all important details to the oil-burning industry. Such standardization will work for economy all along the line; i.e., from the standpoint of the house-owner and installing companies.

To summarize, co-operative effort towards standardization and uniform practice on the part of all interests concerned is the only direct road towards mitigating oil-burner troubles and promoting their use.

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A YEAR ago our attention was drawn to the tremendous increase in the use of liquid fuels for domestic heating purposes, largely the result of a single feature of the newest domestic burners. The results obtained by interlocking control and safety devices, so that the oil burner functioned entirely independent of all human aid or thought, have placed domestic oil-burning in a class almost alone. Only fluid fuel lends itself to complete "heating service."

Gas, unquestionably, is a more desirable fuel, due largely to two facts. First, gas-fired boilers have been developed to a point where, in efficiency, they materially outstrip the conventional house boiler fired with oil. Second, many of the most serious problems in the oil burner industry—ignition, the accurate metering of oil and air, and the complications involving recycling control—all these do not come up in the field of the gas-burner manufacturer.

But, on the other hand, the cost of heating with gas, broadly speaking, is in excess of the cost of oil heating. All this applies to localities where gas is available, and many homes are beyond the limits of gas service.

Domestic oil heating has advanced to the point where it is a large factor in the scheme of domestic economy. Some of the largest and oldest manufacturing concerns, as well as financial interests of the first order, are now active in the oil-burner industry.

The latest oil-burner literature does not stress economy of oil over coal. It does not need to be a matter of dollars-and-cents. It is not a question of "how many gallons of oil equal a ton of coal." It is simply a situation where the American homeowner discovers that oil as a fuel will give him something that coal, as it is burned to-day, cannot possibly give—"heating service." And the wise oil-burner sales manager is developing his campaign along the line of that slogan as marking the channel of least sales-resistance.

More and more Americans are acquiring homes. With the tremendous increase in distributed wealth since the war, these homes are being built and equipped in a manner not dreamt of in earlier days. Two or three years ago, the comparatively expensive automatic oil burner and the refrigerating unit were for the homes of the wealthy. Yesterday we saw the sales of these luxuries extend to what we call "the better class" of homes. Tomorrow, as the fruits of mass production, finance organizations and the research work of combustion and heating engineers, no dwelling fit to be called a home will be neglected in the sales campaigns.

The future holds much promise, largely because intensive laboratory study of the automatic burner is just beginning. Many places of research are publicly, and many more privately, busy with brains and materials. Some of the most important financial interests are concentrating on the problem the best engineering and scientific talent that unlimited resources can command.

The outcome is as far beyond the prognostication of to-day as commercial trans-Atlantic telephony was to the disciples of DeForest twenty-five years ago.

WHY should development not take place along lines that would provide an automatic gas-making machine, making either a stable gas and providing for the storage of a small amount that would be available at any time, while the machine was getting under way, or capable of converting the liquid oil instantly, upon demand, into a gas of sufficient stability to admit of its use within a reasonable radius of the machine?

This oil-gas could be piped to a boiler or furnace of the same high efficiency type that has been developed for public utility gas, to the kitchen gas range for cooking, to the instantaneous water heater for service water, to the various rooms for lighting, to gas grates, and to the refrigerator for food preservation.

Thus all of the utilities of the home would be served by a single unit, with but a single source of fuel.

We have approached so close to the impossible, both in chemistry and mechanics, that even the equipment here outlined may well be developed and left behind in the next ten years of progress.

Operating Data for an Insulated House

Detailed Figures for the Ashenhurst Residence, From Observations Made During the Past Winter

By H. S. Ashenhurst

Ashenhurst Residence From Photograph Taken December 31, 1925
Note snow on roof of house, as well as on roof of garage at left, while roof of nearby house is almost bare.

DURING the summer of 1925 I built a home for myself at 6519 Algonquin Avenue, Chicago. The purpose of this house was to demonstrate the practicability of a number of building ideas acquired through my association, for the past ten years, with architects, builders, real estate men, home-owners and home wanters.

The house was started on June 10, 1925, and on August 10, the same year, I moved into it, so that I have had experience in the house both winter and summer.

In designing the building, I decided to use frame construction throughout. I did this because I think that more beautiful effects can be secured in frame buildings than in other types.

The house occupies a space of 29 x 40 ft. It contains five rooms downstairs and two up. The exterior is of dipped shingles, nailed on matched siding, with a layer of building paper between. The roof is of wooden shingles, also on matched sheathing, with water-proofed paper between.

HEATING PLANT ONE-HALF USUAL SIZE FOR SIMILAR TYPE OF HOUSE

The house is isolated from other dwellings. There is one house on the opposite corner, but no other homes within 500 ft.; consequently, it is exposed to the wind on all sides, and, ordinarily, would be very hard to heat at zero or less.

Mr. Ashenhurst's article supplements the original description of this residence which appeared in THE HEATING AND VENTILATING MAGAZINE *for November,* 1925. *At that time it was stated that Mr. Ashenhurst planned to keep records of outdoor and indoor temperatures during the heating season then commencing. The accompanying article contains the data secured up to December* 30, 1925.

Using the plan I am about to outline, the house not only is as fireproof as a brick house, but has been kept at a constant temperature of 70° F. during sub-zero weather in Chicago, using less than one-half the size of heating plant which engineers would figure as necessary for a house of this size.

It is quite likely you have heard of a gypsum insulating material, known as Insulex. This material is an invention and a development of mine. It has recently been acquired by the Universal Gypsum Company of Chicago, by whom it is being manufactured and merchandised.

While Insulex is a gypsum product, it contains certain chemicals in dry form, which cause it, when mixed with water, to expand to several times its original bulk. It is brought to the job in bags, mixed with water and poured into place. As soon as the water strikes it, it begins to expand. This expansion continues for several minutes. In about thirty minutes it has set hard, leaving a stone structure filled with tiny air cells, and producing an effective insulation condition.

IDEA OF HOUSE INSULATION SUGGESTED BY COLD STORAGE PRACTICE

It seemed to me that if the cold storage man had found it profitable to use several inches of insulation in his buildings, the home-owner might find it equally advantageous to use the same thickness. Therefore I decided to fill the entire space between the studs and the roof rafters with Insulex, starting at the foundation line.

Later, at the suggestion of Homer Linn, of the American Radiator Company, I placed 2 in. of Insulex in the lower floor. The purpose of this was, not only to act as a fire stop, but to keep the living room floors warm, even though the basement were cold.

I want you to visualize a frame building, with the entire space between the studs of the outside walls, the slope of

the roof, the horizontal ceiling and the end gables, filled solidly with insulating material made of rock. You can readily see that this not only fireproofed the outside walls of the building, but cut down heat transmission through the walls and roof. A detailed sketch of this installation is shown on this page.

RADIATION USED DOWNSTAIRS ONLY

For the first season, I decided to use radiation only downstairs. I wanted a heating plant of sufficient size to maintain a constant temperature of 70° under the lowest sub-zero temperature known in Chicago, namely —20°. I also wanted to use a fuel which would require the least attention, gas being chosen to fire the boiler.

Blueprints were submitted to Mr. Linn, to figure on radiation required, and the Peoples' Gas Company was consulted as to the size and type of gas boiler to be used. Their engineers went into the matter thoroughly, took into consideration the amount of insulation, and guaranteed successful heating with a Bryant tubular boiler, Type 4 C. This boiler had a rating of 425 sq. ft. and a capacity for direct radiation of only 213 sq. ft. As a matter of fact, the boiler was not intended for house-heating, but had been designed for heating garages, or furnishing domestic hot water for a two-flat building.

295 SQ. FT. OF WATER RADIATION INSTALLED

Without the insulation, the gas company would not have guaranteed successful heating unless a boiler having a rating of 1150 sq. ft. had been used, with a direct radiation capacity of 575 sq. ft. Mr. Linn, in figuring the radiation required, took the insulation into consideration, and specified a total of 278 sq. ft. 295 sq. ft. was finally installed.

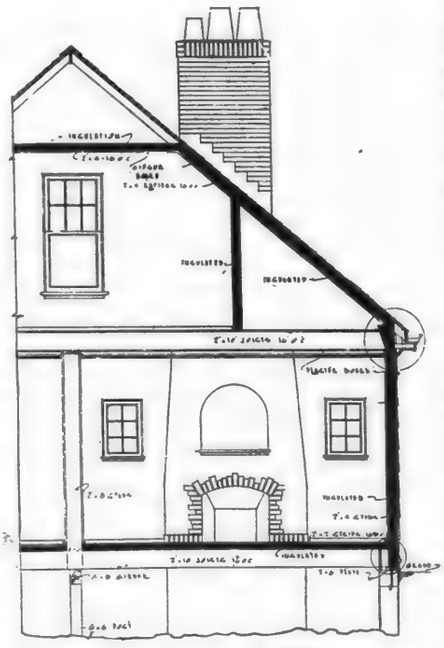
In specifying heating requirements, both radiation and the heater, the figures were given on a water temperature of 180°. Keep this water temperature in mind, because of an interesting development which has arisen.

TESTING INSTRUMENTS USED

In order that a perfect record of results might be secured during the heating season, I consulted Prof. A. C. Willard as to what measuring instruments should be installed. At his suggestion a number of recording instruments were placed in the house. The gas company installed a Taylor double-pen recording thermometer in the living room and one in the upstairs room.

The living room thermometer was connected with a bulb at the breathing line near an inside wall, about the center of the house. The bulb for recording the outside temperature was located at the ceiling of the front porch, in a place not touched by the sun's rays.

The upstairs thermometer was connected with one bulb in the unheated



Construction Details of Ashenhurst Residence Showing Insulation in Side Walls, Roof, Floors and Upstairs Ceiling

upstairs room, and a second bulb immediately above the upstairs ceiling in the attic space under the roof. A daily chart was placed on the gas heater, showing the time of gas consumption during the 24 hours.

The operation of the heating plant was controlled by a Minneapolis regulator. On the wall next to the Minneapolis regulator, three thermometers were placed, one at the ceiling, one at the breathing line and one at the floor, and readings were made of these at intervals. A number of tests were made for humidity, using a Taylor sling psychrometer. In addition to this, meter readings were made every day during the season.

The heating season at the time of this writing was more than 50% over. There were some temperatures as low as 16° below zero. We have some rather astounding evidence, which would seem to prove conclusively just what a well-insulated home means in comfort and fuel economy under all outside temperatures.

HOW THE GAS-FIRED BOILER WAS OPERATED

The Bryant heater has four burners, each one of which has a gas consumption of 40 cu. ft. per hour. These burners can easily be turned on or off. In thinking over the matter I decided to start with one burner to determine just how long this small unit would comfortably heat the house. One burner was turned on early in October, and maintained an even temperature of 70° in the house, even when the outside temperature reached as low as 35°. In maintaining this temperature the water in the boiler was never heated to an excess of 110°.

When the outside temperature dropped below 35° a second burner was lighted. This left still in reserve two additional burners. These two burners have maintained a temperature of 70° in the house even with outside temperatures as low as 16° below zero. A third burner was turned on for one hour on the morning of December 27, raising the temperature of the house from 60° to 70° in this time—a 10° rise in one hour at —16 degrees.

REGULARITY OF HEATING

At no time during the night in this house, except on a few sub-zero nights, was there any gas consumption, the two burners being amply able to bring the house up 10° in the morning.

The temperature of the water in the boiler at no time during the heating season has exceeded 140°. In ordinary winter temperatures the house is warmed up in the morning with water at 130°. This should be compared with the usual water temperature maintained in the ordinary water plant of 180° to 200°. It is a rather remarkable record to heat a house in sub-zero weather, using a heating plant of less than half the capacity ordinarily required, and with a boiler temperature of only 140°.

In contrast with this record is that for a neighbor's house. This neighbor lives in the upper part of a two-flat building. He has the ordinary-sized boiler and the amount of radiation usually installed in Chicago homes. On December 28, he used, in addition to his hot water plant, an electric heater and a coal range in the kitchen. At 8 A.M. his inside temperature was 44°. It took until 8 P.M. to reach 70°. On December 27, at 9:15 A.M. his inside temperature was 46°, at 12 M. 63° and at 2:30 P.M., 70°. On December 29 inside temperature was 45° at 7:30 A.M. and at 8 P.M., 66°. During these same periods, the inside temperature in my home registered 70°, with the much smaller heater, and the gas fire was out for a number of hours each day.

EVEN DISTRIBUTION OF HEAT

I have made a number of checks of the three thermometers located at ceiling, breathing-line and floor, adjoining the thermostatic-control thermometer. At no time has there been to exceed 8° difference between ceiling and floor. The average difference was about 4°.

RELATIVE HUMIDITY MAINTAINED ABOVE 40%

While I have storm windows on my home, there is a single-glass window in the front and back doors. A drop in temperature below 30° always results in a heavy deposit of moisture on these windows, so much so, in fact, that it runs down on the doors. During the very cold weather ice formed on the glass on the front door. I have made a number of tests with a sling psychrometer. These tests have never indicated

a humidity of less than 40%, and sometimes ran as high as 49%. An inquiry among my neighbors has shown no moisture deposits on the windows.

UPSTAIRS ROOMS MAINTAINED AT 50° F.

Just a word about the upstairs rooms. These rooms have no artificial heating, the only source of supply being through the ceiling of the rooms below. However, owing to the fact that they are thoroughly insulated above, they maintain a constant temperature of 50° in ordinary winter weather. This is sufficient for sleeping comfort. Although immediately under the roof, the upstairs rooms are cool and comfortable in hot weather. One day last summer when the official temperature in Chicago was 96°, the temperature upstairs was only 82°.

FUEL COST WITH GAS AT RATE OF $160.00 A YEAR

Gas is costing me 75 cents per 1000 cu. ft. In extremely cold weather, the gas bill will run a little over $1.00 a day. When temperatures are around 30°, consumption runs about 1000 cu. ft. a day. Basing the season's bill on meter readings so far taken, indications are that the total cost will be about $160.00. This is close to one-half the amount it would have cost, had the house not been insulated, so by the use of insulation, it has been possible for me to use a luxury fuel, with no ashes, dust or looking after the fires, at a cost approximately the same as that of anthracite coal. The absence of coal and ashes makes a clean, roomy basement, and practically adds another floor to the house.

The cost of installing insulation was $434.00 which was about what I saved on the cost of the heating plant, so that the real cost of insulating the house was nothing. The house is attracting wide attention and has been visited by thousands of people. Some of the steam fitters in the locality of Chicago are guaranteeing the maintenance of 70° at 19° below zero, where the houses are thoroughly insulated, and giving a 35% reduction in radiation, with a correspondingly small heating plant.

VENTILATION

The house is well ventilated. There is an opening from the kitchen through to the roof and fresh air is taken in through several flue openings. There is no weather stripping on the windows. The house never feels stuffy after being closed up.

Special attention should be called to the snow which covers the roof of the house. This is interesting in view of the fact that the roof of the nearby house, shown in the photograph, is almost bare, showing, of course, the absence of heat loss through the roof. The garage shown at the left of the photograph is also covered with snow, indicating that it is without heat.

The residence here described is open for inspection by those interested.

Motor Boats in Yacht Harbor, San Francisco, Supplied with Electric Heat

Electric Heaters on Yachts

A novelty in the form of heating equipment for yachts at anchor is reported from Yacht Harbor, Cal., where electric wires have been carried from the shore to the boats in the harbor for heating purposes. The wires are carried to the yachts from a concrete landing platform, thence along the gangplank, overhead to the float and out to the boats. Electric heaters installed on the boats are furnished with the necessary current and the electricity is also used for charging batteries of motor boats.

In constructing the concrete landing platform, a metal electric meter box was set into the side. From this meter box a pipe extends to the edge of the concrete platform through which passes the electric wire. The photograph of the landing pier shows how the wire is carried from the end of this pipe to the floor of the gangplank.

Furnace Grate Bars Repaired by Welding Process

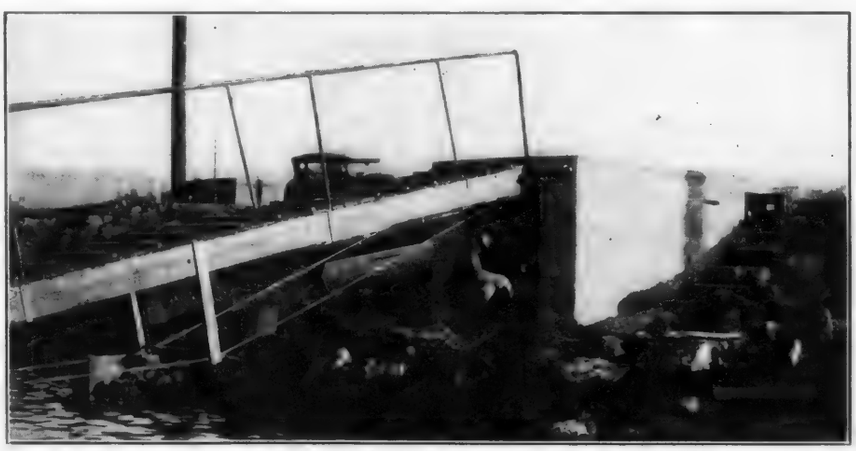
Furnace grate bars can be seen in nearly every welding shop during the winter months, their failure being due generally to their direct contact with hot coals or flames coming up from the ashpit after some live coal has been shaken through. The metal consequently becomes porous and heavily oxidized.

In applying the welding process, the procedure, as explained in *Oxy-Acetylene Tips* for February, 1926, is to chamfer the broken ends to a double V on the grinder. The metal in the vicinity of the break is then cleaned thoroughly. The broken pieces are matched together and blocked in position. Alignment must be good or else the grate will not fit in the furnace.

A recommended method of lining the sections is to set them in the V's of two similar V blocks, and then hold them in position with firebricks. In this way the grate can be turned easily, yet is in shape for welding.

Preheating is unnecessary, since each end is free to expand. A good grade of cast-iron rod, and Ferro flux, are recommended for such jobs. The V is melted down and the weld built up from one side in accordance with accepted cast-iron welding practice. The operator should see that sufficient flux is used to break up and float out the heavy oxide, which is included in this "burnt" metal. Plenty of metal should be added, the weld being built up nearly flush with the teeth of the grate. This will give a greater "body" of good metal in fusion with the burnt-out metal of the grate.

One side being built up, the casting is turned, blocked, and the other sides of the grate welded in succession. The casting should then be carefully laid aside to cool, after which the weld can be smoothed off on the grinder. Under no conditions should the owner take it out of the shop until it is stone cold.



Yacht Harbor Landing in San Francisco From Which Electric Wires are Carried to Motor Boats

Oil Burner Service

The Most Involved and Important Single Problem in the Oil Burner Field. An Analysis, Discussion and Suggestions Representing Present Practice

WHEN the prospect has signed his name to the contract and the check, and become a customer, an intimate relationship begins that forms the basis for the most intricate and puzzling problem facing the executives of a company manufacturing oil burners.

Few there are who look forward to anything but increasing business and success, yet, in the comparatively short period covering instensive oil-burner activities, disaster has come through lack of appreciation of the importance of service. Emphasis has been placed on "sales," and the attitude of many has been that the service question will settle itself. On the other hand, real executives have looked beyond the possibilities of the current year, studied the service developed in other parallel lines of industry, and have laid definite plans to solve this problem before it becomes a matter of life or death.

The executive head of one of the largest and most conservative organizations declares that the service department is of relatively greater importance than the sales department. "An inefficient service department," he says, "can wreck the best sales organization ever organized." On the other hand, an efficient service closely co-ordinated with the sales department, will be a tremendous factor in increasing sales through the medium of the satisfied customer.

IT is obvious that the most valuable contributions to the solution of the oil-burner service problem will come from those actively engaged in the service department. To enable THE HEATING AND VENTILATING MAGAZINE *to be of real service to the industry, we will publish, and pay for at regular space rates, such contributions on this subject from its readers as may be used.*

PURCHASING AN OIL BURNER IS DIFFERENT

The conditions of purchase of an oil burner are so materially different from those surrounding the acquirement of almost every other piece of equipment for the home, with the exception of the refrigerating unit, that it has introduced a new situation. The sale of a heating boiler involves only a guarantee that the materials are not defective, and that the workmanship is first-class. The boiler usually serves for year after year, forgotten by its maker. It is a dead (at least frequently unresponsive) mass of cast-iron, devoid of feelings.

Then comes along a gang of men who attach to this boiler a living thing. Thermostats and stackstats and aquastats are put in, and, when the burner has been adjusted, started and left alone in the basement, a new element has entered into that home. A temperamental personality, sensitive (the catalogs say to one degree of heat, which is far more than the sensitiveness of the human body), this interlocking mechanism takes control of the situation and handles it in a superhuman way. No fireman, regardless of his ability, could maintain a temperature so uniform. No human being could go on, hour after hour and day after day, through the entire heating season—never A.W.O.L.

The members of the household are fed regularly, and with proper food. They have periods of rest, the quarters in which they live are kept clean, and so are their bodies. Yet, wherever men congregate in their dwellings, there will be found doctors who make their living as the result of service calls on the human mechanisms in their communities.

Contrast the attention given to these humans with that under which the average oil-burner operates. Fuel frequently ill adapted to its mechanism or adjustment, a dusty atmosphere, and frequently dirt actually thrown onto the burner, infrequent cleaning and neglected lubrication—is it any wonder that service calls are required?

CLASSIFYING OIL BURNER SERVICE CALLS

It follows, from a very casual study of oil burner service calls, that they may be divided into three classes: (a) calls resulting from mal-functioning of the burner, or its failure to function; (b) calls for adjustment or repair of some of the supplementary equipment; or (c) calls due to the failure of those in the home properly to do their part.

Considered, in inverse order, it is surprising how many service calls are due to the failure of the humans to order oil; how many service calls will be due to the blowing of a fuse that might easily be replaced by a child; how many calls report that the burner is not operating, although the control thermostat indicates a lower temperature than that for which the control is set; (a thoughtless inmate has left the window open and the safety device on the boiler has prevented the burner from operating and, perhaps, damaging it) or the dog or cat, playing with a ball or a bone has actuated the trip bucket.

With increasing accessories there is, of course, an increase in the possibilities of trouble. A tank may have sunk or shifted, and oil may leak into the cellar or out into the ground to waste. A damper setting may have been changed by a child; someone may have played with the thermostat, or its clock may have been wound and replaced incorrectly; any one of the several control or safety devices may have been tampered with, or may have failed. The strainer may have clogged from dirt, or have filled with water from the oil.

And, after all of these extraneous troubles, there comes the service call for a difficulty in connection with the burner itself. This will vary widely, with the type of burner, the constructional characteristics and the way it is treated by the household.

EXTREMES IN OIL-BURNER TYPES REQUIRE LITTLE SERVICE

Citations of individual cases do not count for much compared with averages of large numbers, yet two examples might be quoted, and these afford food for thought.

A mechanical-draft burner of the highest type has been in service four full heating seasons. It represents the last word in materials and exquisite construction. The owner pays an inspection call to it as regularly as he leaves his breakfast table. He cleans the atomizer of any possible accumulation of residue by means of a small square wooden rod. He is liable to pick up a duster and flick it over the mechanism. The whole operation consumes about a minute. As far as that man is concerned, the nearest service man has always been a million miles away—he has never called one.

Another installation is "one of those cheap gravity things." It is installed in a copper-tube boiler, and burning with a bunsen flame, approaches very closely to gas practice. Outside of once smoking up the tubes in some unexplained manner, this burner operates untouched for two weeks without the slightest attention. It is then shut off and cleaned. The process consumes an hour and a half of time. Then another two weeks of inattention. There is practically nothing connected with this burner that

requires servicing. These two extremes, the simplicity of the one and the extraordinary care given to the production of the other, result in about as perfect satisfaction to the homeowner as could be expected of any mechanical contrivance.

THREE CONSIDERATIONS DETERMINE CUSTOMER SATISFACTION

Now let us go back again and look at the service situation from another angle. There are three factors developed at the very outset that are vital in relation to cutomer satisfaction. The first of these really comes from a pre-installation consideration. It is determined by the carefulness with which the sale is made. If the salesman has the requisite knowledge of heating engineering, and applies it, there is little danger that the burner will not fit the job. If the salesman is more interested in his commission than in the engineering involved, a misfit may follow, and service calls will be the result. These calls will continue, because the burner will never "be right."

The same thought may be applied to the care with which the survey of a heating plant and home is made prior to the acceptance of the contract for the burner. One manufacturer estimates that these surveys cost about $30 apiece, on an average, and he says that they are worth three times that in eliminating service calls. In other words, when the burner has been sent to the job, the manufacturer has a clear track—there are no danger or even caution signals set against a record run. If there is anything defective about the heating plant, it has been remedied.

The next factor is concerned with the actual work of installation. Now, the installation problem is not alone a question of getting a man capable of cutting a clean thread and setting up a tight joint. Recently, two "service calls" came, at high speed, through a local sales office and the territorial distributor clear up to the general manager of one of the largest manufacturers. Two Italian laborers dug a hole for a tank. Then, in a brief tour of the cellar they discovered a keg of "home-made." It was irresistible. Two hours later a service truck carried them to the next job where a hole was wanted. One was too sound asleep to even attempt the job. The other found some of the servants too attractive, and persisted in joyful attempts to be friendly until removed to the police station. The next morning the general sales manager had two irate men to handle, both customers of such recent date that there was no background of relationship to fall back on.

The service manager has his troubles. The personnel is a constantly moving element that is never entirely solved. It is no easy task to formulate installation plans so that every possible contingency met in hundreds of jobs, no two of which are alike, may be rapidly and correctly met. With increasing competition the cost of installation must be cut to the bone, and a little slip-up may run the cost of the job well above the allowed figure.

The third, and not the least, factor is the thoroughness with which the necessary instructions for supervision of the burner are conveyed to the member or members of the household upon whom will rest the responsibility for the burner operation. Naturally, it is better to have more than one member of a household understand the operation of the burner and be capable of performing such slight operations as may be required to secure continued operation.

There is, for instance, the possibility of a blown fuse. This should be gone into so thoroughly that no excuse could be offered for calling a service man to put in a new fuse. At least, two spare fuses should be supplied, and a simple test explained that would indicate a "dead" fuse. It would cost less to wire a pilot-light across the line, inside of the fuse, than to answer one call for the purpose of replacing a blown fuse.

It is amazing how many service calls come from customers who have let their oil tanks become empty. One reason for this is the practice of selling 275-gal. basement tanks in order to keep the installed price of the burner low. Another source of trouble is the use of improper lubricating oil for the burner mechanism. It does not even hold that a burner is immune from trouble of this sort because it is designed to be oiled but once during a season. Such a burner required a pretty complete overhaul because the owner filled the sump to the brim with linseed oil.

HOW TO ELIMINATE 90% OF "HUMAN NATURE" SERVICE CALLS

One executive states that he looks upon the oil burner service problem as a parallel to that confronting the automobile dealer of 1900. "The average householder," he says, "is afraid to touch the burner if it does not work perfectly, for fear that it will blow up the house." This element of fear may be easily eliminated in 90% of the cases if the individual who adjusts the burner and starts it will really take an interest in seeing that the owner becomes *familiar* with the burner. Familiarity cannot come by ear. It is acquired by the sense of touch—by actually doing the necessary thing. Consider a similar but somewhat more complicated case, where an installation or test engineer is to break in an engineer to handle a Diesel engine. He may go through the operations time after time until the engineer thoroughly understands the sequence and meaning of operations but, until he has *actually handled* the control levers and *felt* the response of the mechanism *to his actions*, he, too, will have a sense of fear, and this will not depart until he has performed the cycle enough times to be able to do it instinctively.

So, when installing an oil burner, the householder should have all the necessary points explained until he understands them, and should then *repeatedly* perform such operations as may, at any time, become required until he has lost the "strange" feeling that invariably attaches to the novice.

"A combination of tact and hardboiledness is necessary" is the way one sales manager expresses the way in which purchasers of oil burners must be dealt with, in connection with service.

This is the first of a series of articles on this subject, the second of which will appear at an early date. Vital and interesting statistics have been furnished by the service departments of nearly all of the leading oil-burner manufacturers, and these will be tabulated, analyzed and discussed. Suggestions will be offered for the solution of some of the difficulties that are bothering service managers.

Installment Selling Reaches $5,000,000,000 Annually

The rapid growth of installment selling, which has now reached a peak of $5,000,000,000 annually is reflected in a preliminary survey made by the Department of Domestic Distribution of the Chamber of Commerce of the United States. The department estimates that 17% of the entire amount of consumers' goods sold at retail are disposed of in this manner and the trend is still upward. It finds, however, that information concerning the extent and character of the market is too meager to justify a conclusion as to whether it is an economic menace or a legitimate development. The Farmers' Loan & Trust Company estimates that $3,293,411,878 worth of automobiles, washing machines, vacuum cleaners, phonographs, furniture, pianos, jewelry and radio apparatus are sold on the installment plan. The General Motors Acceptance Corporation's operations for its seven years of existence total $509,250,454 with a loss ratio for 1925 of 0.012%.

It is found that outside of the trade in which it is an established practice, installment selling shows an increase in the clothing and radio trade and that in others, like hardware, paints and varnish, this introduction has been strongly resisted.

Where such large sums are involved as the credits represented by $5,000,000,000 annually, states the report, it was inevitable that some form of financial aid would be evolved and it is found now in the organization of large numbers of so-called finance companies or commercial credit companies, which were organized first, as an outgrowth of the immense increase in the production of automobiles. At a meeting in December, 1924, 300 companies, representing 90% of all automobile financing, were organized as the National Association of Finance Companies.

High Spots in the Open-Window Discussion

NOW that the full report has appeared in the A.S.H. & V.E. *Journal* of the discussion of open-window ventilation for schoolrooms at the annual meeting of the American Society of Heating and Ventilating Engineers, in Buffalo last January, it is possible to give in detail the high spots of the discussion. For instance, one of the points which aroused the most comment was that made by Dr. C.-E. A. Winslow to the effect that "the science of ventilation, as it has been understood by the engineering profession from the time of Billings and Woodbridge almost to the present day, has been based on the conception of the German hygienist, von Pettenkofer," that the bad effects of air in poorly-ventilated rooms were due to alleged organic poisons excreted into the atmosphere from the human body and that the object of ventilation was the removal of these poisons by dilution with fresh air. This, Dr. Winslow maintained, was the basis of our 30 cu. ft. per minute per pupil standard. On this point, Dr. E. V. Hill said, among other things:

"If I read the history of ventilation correctly (and I have given it some study), it seems to me that Pettenkofer suggested, if my memory is correct, 10 parts of carbon dioxide, as a desirable standard. He thought that there were poisonous substances exhaled by the occupants of a room and suggested that carbon dioxide *might* be used as an index.

"Now, mind you, these supposedly poisonous substances have never been isolated. No one knew what they were and, of course, there was no information possible as to their toxicity. Therefore, it would be manifestly impossible for anyone like Pettenkofer, who was a scientist of distinction, to say what concentration of CO_2 would be necessary to maintain a certain degree of air purity. It is ridiculous on the face of it. Such a thing could not be. The only thing that carbon dioxide ever was used for, as I see it, was to measure the amount of air necessary to remove the objectionable odors in a classroom."

From this, Dr. Hill showed very clearly that where Billings referred to the carbon-dioxide standard, he makes it clear that the standard is a measure of the odors in a room, and not of the organic impurities.

Another statement of Dr. Winslow's which aroused much discussion was his comment that "with the plenum system, it was necessary to keep the schoolrooms at an average temperature of 68½° in order to protect the children against the chilling effect on the face of the powerful draft of air. With the gravity method, the schoolrooms could be kept at an average temperature of 66½°. According to your Research Laboratory studies, these two atmospheric conditions, 68½° with a high air flow, and 66½° with low air flow, are substantially equivalent in their power of removing heat from the body. As a matter of practical experience, however, it was the unanimous opinion, of teachers and observers alike, that the cool room with the lower air flow was more agreeable than the warm room with the exchange of 30 cu. ft. per minute."

A little further along he stated:

"If these results are accepted, as I believe they must be, as demonstrating that a positive system of fan ventilation supplying 30 cu. ft. of air per minute is unnecessary in an ordinary schoolroom, we are faced with the fact that existing legislation requiring the installation of such systems is the cause of a large and indefensible waste of public funds."

Of course, the answer made to this point was that with a properly-designed fan system, no uncomfortable drafts would result from the maintenance of a temperature of 68½° and a comparatively high air flow.

Dr. Winslow's comment on the need of standards in ventilation brought forth the rejoinder from Perry West, that:

SYNTHETIC AIR CHART A SCIENTIFIC STANDARD

"Professor Winslow seems to misunderstand the *modus operandi* of the Synthetic Air Chart when he states that it fails to distinguish between what is important and what is unimportant. I believe that if he thoroughly understood this chart he would immediately see that this is just what it does do. It is the only measure which we have to-day that in any way attempts to afford a scientific means of including all of these factors and giving to each a distinguishing and comparable value.

"This standard for measuring the quality of ventilation is the result of much hard work and thought on the part of a number of the leading members of this society and a number of the leading doctors and physiologists throughout the country and has been officially adopted by this society as its standard. It is not, therefore, simply a standard advocated by some members of this society, as Professor Winslow has evidently allowed himself to believe. The values for the various factors are always subject to revision as new re-

In the Public Eye

Dr. C. E. A. Winslow,
Professor of Public Health, Yale University, and President of the American Public Health Association.

DR. WINSLOW'S status as the champion of open-window ventilation for schoolrooms has brought many inquiries from our readers as to his career. In response to our request Dr. Winslow has kindly favored us with a summary of his many activities. He writes:

"I graduated from the Massachusetts Institute of Technology in 1898 and took my M.S. degree there in 1899, both in the Department of Biology and Public Health, under the late Professor W. T. Sedgwick. Thereafter, I taught under Professor Sedgwick until 1910 when I went to Chicago and, later, to New York.

"My investigations have dealt, in the main, with environmental factors bearing on health and efficiency, such as water supply, sewage disposal, ventilation and industrial dusts. While in Boston I was for some years biologist in charge of the sanitary research laboratory and sewage experiment station which conducted somewhat exhaustive studies in regard to the purification of Boston sewage.

"My active interest in ventilation began about 1910 with the study of the work accomplished by Hill and Haldane, in England, and, as you know, in 1913 I was appointed chairman of the New York State Commis-

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search may dictate, but I do not see how the principle of this standard could be so easily laid aside by any of us who are seeking the best light to be had upon this subject."

IS THERE AN OPTIMUM TEMPERATURE FOR A LARGE NUMBER OF INDIVIDUALS?

Although not replying directly to the points raised, Dr. W. J. McConnell offered the suggestion that there might be an optimum temperature for a large number of individuals. "May it not be," he said, "that each individual has his own optimum temperature depending upon his physical condition, the condition of his skin, the amount of clothing worn, the amount of work accomplished, and no doubt, other factors, and that this optimum condition may change slightly from day to day and vary the optimum condition of other individuals?"

SOME ACTUAL COST FIGURES

Some of the best points brought out in the discussion were those made by Perry West in connection with the actual cost figures for the building construction, as well as for the heating system itself. Following are his remarks on these points:

"The heating of an average schoolroom, independent of its air supply in our cooler climates requires about 100 sq. ft. of direct radiation. If we add the necessary radiation for heating the minimum of 10 cu. ft. of air per min. per pupil for window ventilation it will require about 225 sq. ft. of direct radiation. *This will about double the cost of our heating system.*

"Adding to this the increased cost of building due to increasing the class room space from 200 cu. ft., ordinarily required with mechanical ventilation, to 280 cu. ft. required for window ventilation, we have 40% increase in the class room cubiture which represents an *increase of 15% in the cost of the entire building.*

"The cost of the heating, disregarding the air supply, is 8% of the cost of the building and the cost of *mechanical ventilation is 7% of the cost of the building.*

"Taking the 8% and adding to it another 8% for increasing the radiation sufficient for window ventilation and then adding 15% for the added cost of the building we have a total of *31% for the window ventilated school.*

"Taking the 8% for heating and adding 7% *for ventilation* we have *15% as the comparative cost for the mechanically ventilated school.* This not considering added costs for larger exhaust ducts, window ventilators and the fact that east rooms must be planned against with window ventilation, as recommended by the New York State Commission's report.

"The above comparison is on the basis of our colder climates where the heating and ventilating cannot be done by a fan system without direct radiation. In some of our milder climates, such as around St. Louis, where the ventilating system does the heating also, the cost for heating and ventilating apparatus is not much more than 8% to 10% of the cost of the building.

"So that the comparison is still more in favor of mechanical ventilation.

"As to the yearly cost to operate with and without mechanical ventilation: Theoretically, it should (in our colder seaboard climates) require 2 tons of coal per class room per season for heating alone; 4 additional tons for ventilation, making a total of 6 tons for heating and ventilating where the air is all taken in from the outside. With proper recirculation the coal required for ventilation may be cut to 2 tons, making a total of 4 tons to heat and ventilate.

OPERATING EXPENSE FOR HEATING AND VENTILATING SCHOOLS

"This is theoretical, but an analysis of the operating cost for a number of schools in one of our larger cities, over a period of three years with the ventilation in operation and a period of seven years without the ventilation in operation, discloses some very interesting facts in connection with the practical side of this question.

"It was found, for instance, that for 10 schools with mechanical ventilation and temperature control, 6.7 tons of coal per class room per year were required with the ventilation running and 6.3 tons for heating the building alone without the ventilation running. In eight schools with mechanical ventilation but without temperature control, 6.9 tons per class room per year were required with the ventilation running, and 5.7 tons for heating alone without the ventilation. For 14 schools without mechanical ventilation or temperature control 5.85 tons per class room per year were required during the first (3-year period) and 5.75 tons per class room per year for the second (7-year period).

"It will be seen from the above that the schools with ventilation in operation required approximately the theoretical amount of coal whereas the schools without ventilation in operation required about three times the theoretical coal due to the fact that without ventilation the windows are open very much more of the time and the building is required to be heated to a much higher temperature in order to be comfortable.

RECIRCULATION REDUCES COSTS

"From the figures quoted, in practice, but little more coal may be required for taking care of heating and ventilating than is otherwise required for heating alone. It would be well to say, however, that we may figure 1 ton more per class room per year at $10.00 per ton and adding to this the cost of electric current (to drive the ventilating fans) at $15.00 per year we will have a total cost of $25.00 per class room per year for the operation of the ventilation. This may be reduced by proper recirculation and air conditioning to no addition for coal and about $7.50 for electric current.

"The figures given are for schools without window ventilation and about ½ ton of coal should be added for this, which would mean that the operating costs would about balance, except for the fact that the number of pupils in a window ventilated school is reduced from 20% to 30%. This would naturally mean that the operating cost per pupil would be from 20% to 30% higher in the window ventilated schools.

"None of the above figures takes into account the very much larger added costs in teachers' salaries and general overhead for operating a school building involved in so materially cutting down the number of pupils accommodated."

LACK OF CONTROL WITH WINDOW VENTILATION

Several of the speakers emphasized the absence of control with window ventilation and made the point that the functions of the physiologists are limited to specifying what conditions should be maintained in rooms. The fulfillment of these conditions is distinctly an engineering proposition and is one that should be left in the hands of engineers.

On the question of control, Dr. Hill covered the situation by stating:

"Looking at this question in a broad light, it seems to me that there should be no distinction made between the *methods* of ventilation provided the *conditions* in the rooms ventilated are carried constant. Mechanical ventilation is I think the method of the future. The

In the Public Eye

(Continued from Page 82)

sion on Ventilation. The studies made by the commission reinforced my conviction, based on the English work, that emphasis on air dilution, as opposed to temperature control, was seriously handicapping the efficiency of ventilating practice and my views on this subject, which is the point of most interest to your readers, have recently been presented in an article on "The Dead Hand in School Ventilation," in *The American School Board Journal* for June, 1925; in an address before the American Society of Heating and Ventilating Engineers, published in the A.S.H. & V.E. *Journal* for March, 1926, and in a book on "Fresh Air and Ventilation," recently issued by E. P. Dutton & Co., New York.

C. E. A. Winslow

Professor of Public Health

keynote of mechanical ventilation is control. With mechanically-ventilated rooms nothing is left to chance. With the window ventilated rooms nothing is left *but* chance."

Finally, Dean F. Paul Anderson summed up the situation by declaring that "this crude theory of window-ventilation occupies the same relation to modern methods of mechanical ventilation that the old sailing vessels had to the superb, modern trans-Atlantic liners."

"The only difference that I have with Professor Winslow," he continued, "is that he is ignoring the progress that has been made in the science of ventilation and has gone back to a process as crude as that employed by the old sailing vessel. . . . The report will do untold harm because it will tend to slow up progress that was being made very rapidly toward the solution of a rational method of ventilation.

"You must admit, Professor Winslow," declared Dean Anderson earnestly, "that we have given to the ventilating engineers a wealth of conclusive findings from the society's Research Laboratory at Pittsburgh. You pay much appreciated tribute to the achievements of this Laboratory, but we are disappointed that you do not take the facts and tie them to a positive method of moving air. Some day, we will prove more definitely just how many air changes are desirable. This amount necessarily causes some difference of opinion now. There is one thing quite plain, however; whatever the number of changes required may be, window ventilation will not positively and constantly give what we specify.

"If I had time to bring before you the array of scientific facts to show how close we have arrived, at the Pittsburgh Laboratory, to the ideal atmosphere, I would also answer the point on the cost of ventilation systems which you stress so much. What would $2,000,000 or $3,000,000 a year be for new installations of ventilating apparatus, if we contributed in the slightest degree to the health of our boys and girls? In this age of having everything we want, this argument, even if valid, would not scare many boards of education who really wanted to serve the children of this country.

"Three million dollars a year for fresh air, one million dollars a week for chewing gum!"

DR. WINSLOW'S REBUTTAL

In his final rebuttal, Dr. Winslow explained his reason for bringing in von Pettenkofer so prominently. It was not, he said, because he thought any of his hearers believed in the poison theory, but because he thought and still thinks that the Pettenkofer theory is the historical basis for the 30 cu. ft. constant.

"As I see it," said Dr. Winslow, "there are really only two fundamental questions which divide us. We are all agreed that the essential in school ventilation is the maintenance of the 'effective temperature,' which the gentlemen from Pittsburgh have cited as 66°. The first important difference of opinion is whether an 'effective temperature' of 66°, however arrived at, by whatever combination of temperature, humidity and air motion, is equally satisfactory.

"We are convinced from our studies in New York that while, in general, these 'effective temperatures' are roughly equivalent, yet within that equivalency, when the situation is studied with large numbers of individuals over long periods of time, as we studied it, an 'effective temperature' of 66°, obtained with a low flow of cool air, is more comfortable than the same 'effective temperature' obtained with a high flow of warm air.

"If this conclusion is justified," he continued, "if it proves that we are right in feeling that a low flow of cool air is better than a high flow of warm air, then, inevitably, the 30 cu. ft. standard falls by the wayside, as at least needless, if not harmful, and no atom of new evidence has been presented here of any kind to show that the 30 cu. ft. air standard is necessary for health or comfort."

Dr. Winslow quoted the "effective temperature" curves as developed at the Research Laboratory to prove the point that "if the 30 cu. ft. standard is unnecessary, it seems clear that experimentation and practice should no longer be limited by the imposition of a legal standard which prohibits other procedures. The 30 cu. ft. standard in itself, of course, has nothing necessarily in theory to do with window or fan ventilation, but with window ventilation you cannot possibly obtain as high an air flow as that, while with fan ventilation you can obtain a higher air flow or a lower air flow, as desired."

Replying to the points brought out regarding the relative construction cost, Dr. Winslow said:

"Just one word or two about the question of cost. The conditions that are laid down as ideal conditions for window-gravity ventilation in the New York report are very extreme conditions, very ideal conditions, and in making cost estimates it is not fair to compare that ideal (with its very small number of pupils in a class room and a very large exhaust duct) with anything but equally ideal and extreme fan ventilation.

"As a matter of fact let me remind you that we obtained these entirely satisfactory results discussed above with schoolrooms that had no excess radiation in them. You will find the actual figures all set down in the report. There was no more radiation in the window-gravity rooms than in the fan rooms and yet they operated with perfect success in the climate of New England. There was certainly no possibility of any excess cost, because they were built as fan buildings for the most part and used by merely dropping out the fan part of the system. In the one case in Fairfield, Connecticut, where we had a building designed as a window-ventilated building, that, too, had approximately the same heating surface that the fan-ventilated buildings had."

Important Subjects Coming up at Convention of Heating Contractors

Among the important subjects that will come up for discussion at the forthcoming annual convention of the Heating and Piping Contractors' National Association in Washington, D. C., June 1-4, are "Certified Heating" and the "Time-Payment Plan." The demand for information on certified heating is such that those in charge of the program are considering giving it an entire session. This probably will be an evening meeting and there will be opportunity for a thorough airing of the different phases of this subject, such as the aims, basis and methods of accomplishing certified heating in any community.

The discussion of the time-payment plan, it is expected, will bring out strong arguments for and against its usefulness. It is proposed to invite two formal speakers, who will present each side of the question and then the meeting will be thrown open for discussion.

In connection with the work of the committee on boiler rating, it is stated that George M. Getschow, of Chicago, chairman of the Boiler Output Committee, will have an important report showing the progress made in this direction since the last annual convention.

Any of our readers who have suggestions for additional subjects are invited to send them to the headquarters of the association, 50 Union Square, New York, or they may be sent directly to THE HEATING AND VENTILATING MAGAZINE in which case they will be promptly forwarded to the association.

It is announced that a reduced fare will be available to those who attend the convention.

Death of E. Graham Rhoads

A pioneer in the domestic oil burner industry passed away when E. Graham Rhoads, first vice-president of the Winslow Boiler & Engineering Company, Galesburg, Ill., died in New York, February 23. Mr. Rhoads was the father of Kleen-Heet, a well-known domestic oil-burning apparatus. Early in 1916 he became deeply interested in oil-burning steam automobiles. Soon thereafter he conceived the idea of applying his oil-burning principles to the broader field of automatic home heating.

In a tribute paid to Mr. Rhoads by his associates, the statement is made that "his far-sightedness, tenacity of purpose, tireless energy, sound mechanical ideas and ceaseless loyalty created this industry. The passing of Mr. Rhoads has deprived us of a sound business associate, as well as of a loving friend and companion."

Thomas Snell Weaver School, Hartford, Conn., Equipped with Window Ventilation

The First Important Open-Window Ventilated School

NOW that the subject of open-window ventilation is occupying so large a place in the discussions of the day, fresh interest attaches to what has been described as the first important open-window ventilated system in a modern type of school building. It is the Thomas Snell Weaver School, in Hartford, Conn.

An interesting item in connection with this building is that the architects and engineers are the Frank Irving Cooper Corporation, of Boston, Mr. Cooper being also a member of the American Society of Heating and Ventilating Engineers.

At the A.S.H. & V.E. meeting in New York, in 1924, Mr. Cooper told of the construction of this school and how it was a companion building to one in the same city (the Morgan Gardner Bulkeley High School) having a recirculating washed-air system of heating and ventilation.

At that time he stated that when the window-ventilated building plans were sent out for alternate bids, the cost of the window-ventilated building was estimated at $32,000 less than that for the same building with air-recirculating equipment. The total estimated cost of the building was $1,500,000.

The equipments in both of the buildings referred to were designed by the same engineer, C. D. Kimball, of Boston, and both systems were installed by members of the society, the window-ventilating system by Bain of Boston and the air-recirculating system by Libby & Blinn, of Hartford, Conn.

Among other things, according to Mr. Cooper's statement, it was found that where three boilers were provided for in the building using recirculated air, in the window-ventilated building four boilers were necessary.

In response to a recent letter to Mr. Cooper, calling his attention to the points that window-ventilated schools require more floor space per pupil and a larger heating equipment than fan-ventilated schools, he states that this is not so in the case of the two Hartford schools.

"It is the intention of some of the physicians in Hartford, connected with school work," he adds, "to make a comparative study of the ventilation in these two buildings as soon as they are in running order."

Boston Adopts Certified Heating

One of the important actions taken at the recent annual meeting of the Heating and Piping Contractors Boston Association was the adoption of the the "Certified Heating" plan. In accordance with this plan, all members of the association, before undertaking a heating contract, will submit their plans to the association for checking. When these plans are certified by the association, they will be considered as meeting the standard minimum requirements. After the installation is made the association will issue a certificate to the building owner to the effect that the work is being done according to the standards of the association and is adequate for its purpose.

In this connection the Standard Estimating Radiation Tables which form a part of the "Engineering Standards" of the Heating and Piping Contractors National Association will be used as the basis for checking any given radiation estimates. (These Standard Estimating Radiation Tables for Boston and 23 other cities are now appearing in serial form in THE HEATING AND VENTILATING MAGAZINE.)

Notification of the adoption of the plan has been sent to all architects, real estate operators, contractors, savings and co-operative banks and building loan associations and to prospective home owners. In addition, a publicity campaign will be conducted to educate the general public regarding the benefits of certified heating. The cost of the service to the members is estimated at 1 cent per square foot of radiation.

The new officers of the Boston association, elected at the same meeting, are:

President, Herbert A. Snow (re-elected for his third term); vice-president, Maurice E. Chase; treasurer, Peter J. McMurrer, the McMurrer Company; manager, Daniel W. Boynton. Directors: F. S. Cleghorn, Cleghorn Company; E. A. Dusossoit, Lynch & Woodward; I. D. McLean, McLean & Cousens; and Thomas O'Callaghan, Acme Heating & Ventilating Company.

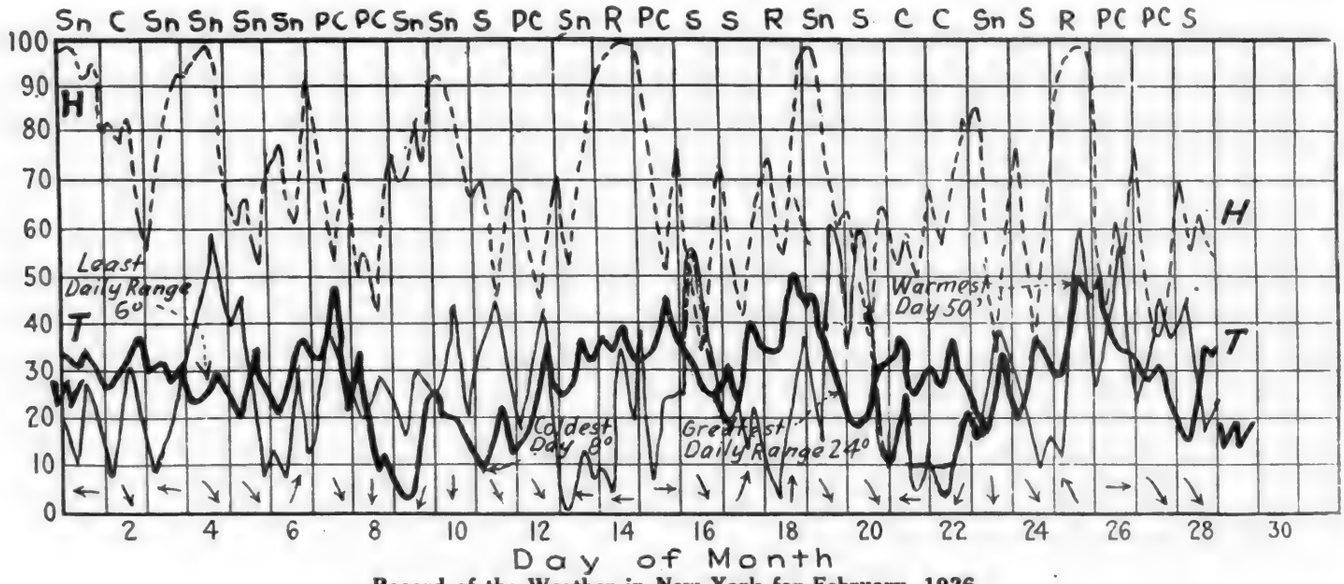
Ralph S. Franklin, of Albert B. Franklin, Inc., was named chairman of the Standards Committee; M. E. Chase, of Maurice E. Chase, chairman of the Examining Board; Frank A. Merrill, of the Merrill Company, chairman of the Trades Relations Committee.

Oil Low on Fire List

According to the National Board of Fire Underwriters, petroleum is ninth in the list of known causes of fires. In the board's monthly publication, for February, the statement is made that the total losses due to oil amount to $11,619,306. The first eight causes in the order of their importance are: Exposure, matches, smoking, defective chimneys and flues; stoves, furnaces, boilers and their pipes; spontaneous combustion, sparks on roof, electricity, and lightning.

The Weather for February, 1926

	New York	Boston	Pittsburgh	Chicago	St. Louis
Highest temperature, deg. F.	50	48	55	53	69
Date of highest temperature	25	25-26	25	28	28
Lowest temperature, deg. F.	8	11	10	13	20
Date of lowest temperature	11	10	10	11	19
Greatest daily range, deg. F.	24	22	30	25	37
Date of greatest daily range, deg. F.	19	17	19	28	28
Least daily range, deg. F.	6	5	5	2	3
Date of least daily range, Deg. F.	4	14	14	8	10
Mean temperature for month, deg. F.	29.4	27.8	31.8	30.9	40.2
Normal mean temp. for month, deg. F.	31.3	28.8	32.3	26.3	34.8
Total precipitation, this month, in.	5.46	5.56	3.47	2.92	2.52
Total snowfall, in.	25.7	27.6	17.2	9.0	Trace
Normal precipitation, this month, in.	3.47	3.44	2.66	2.16	2.75
Total wind movement, for month, miles.	14790	8411	8730	8663	9669
Average wind velocity, miles per hour	22.0	12.5	13.0	12.9	14.4
Prevailing direction of wind	N. W.	N. W.	W.	N. W.	N. W.
Number of clear days	8	10	1	4	7
Number of partly cloudy days	6	6	3	4	6
Number of cloudy days	14	12	24	20	15
Number of days with precipitation	12	12	18	11	11
Number of days with snow	9	11	9	5	None
Snow on ground at end of month, in.	Trace	1.6	Trace	None	None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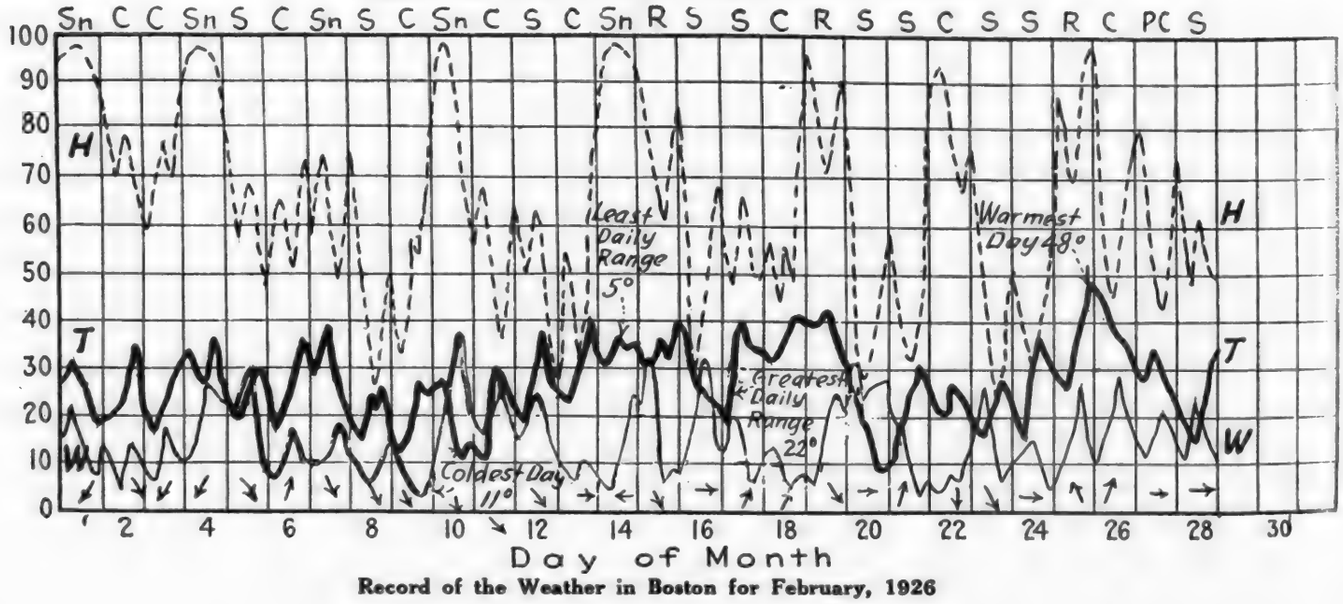
Least Daily Range 6°
Coldest Day 8°
Greatest Daily Range 24°
Warmest Day 50°
Day of Month

Record of the Weather in New York for February, 1926
(Hourly observations of the Relative Humidity Plotted on this Chart)


Sn C C Sn S C Sn S C Sn C S C Sn R S S C R S S C S S R C PC S
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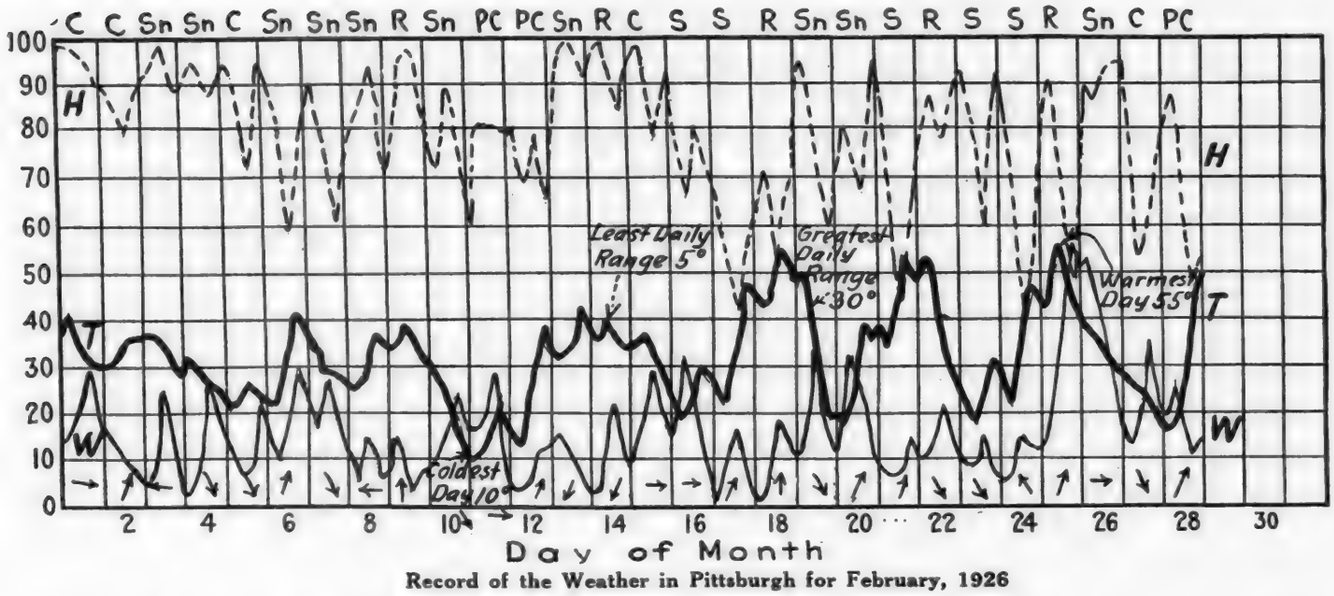
Least Daily Range 5°
Coldest Day 11°
Greatest Daily Range 22°
Warmest Day 48°
Day of Month

Record of the Weather in Boston for February, 1926


C C Sn Sn C Sn Sn Sn R Sn PC PC Sn R C S S R Sn Sn S R S S R Sn C PC
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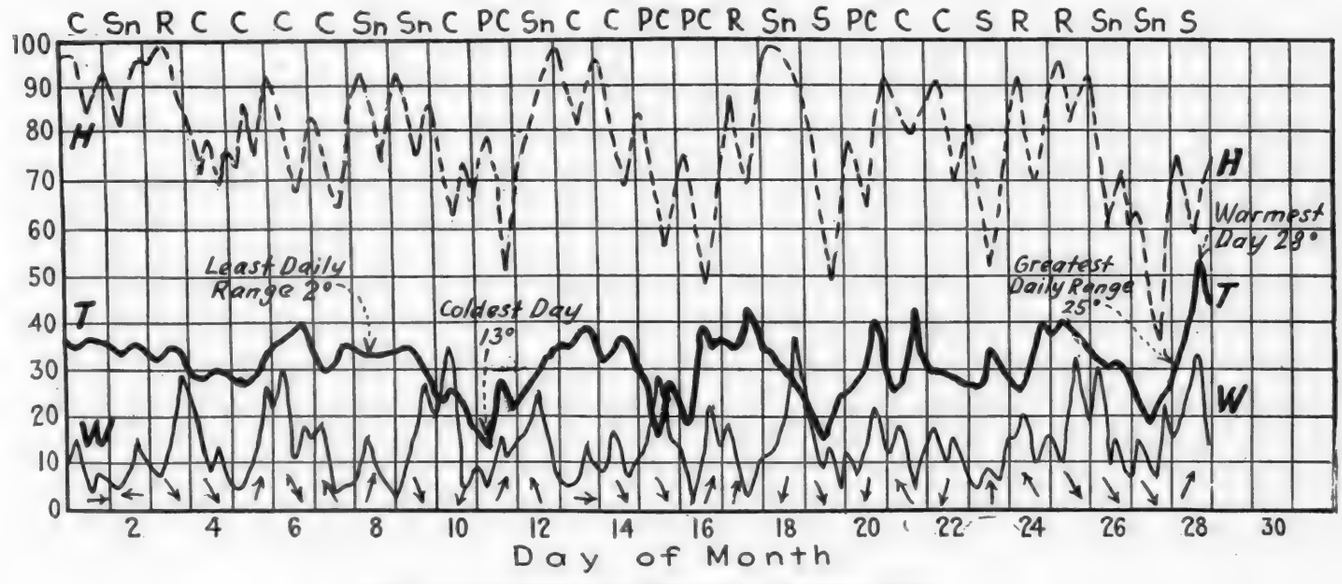
Least Daily Range 5°
Greatest Daily Range 30°
Warmest Day 55°
Coldest Day 10°
Day of Month

Record of the Weather in Pittsburgh for February, 1926


C Sn R C C C C Sn Sn C PC Sn C C PC PC R Sn S PC C C S R R Sn Sn S
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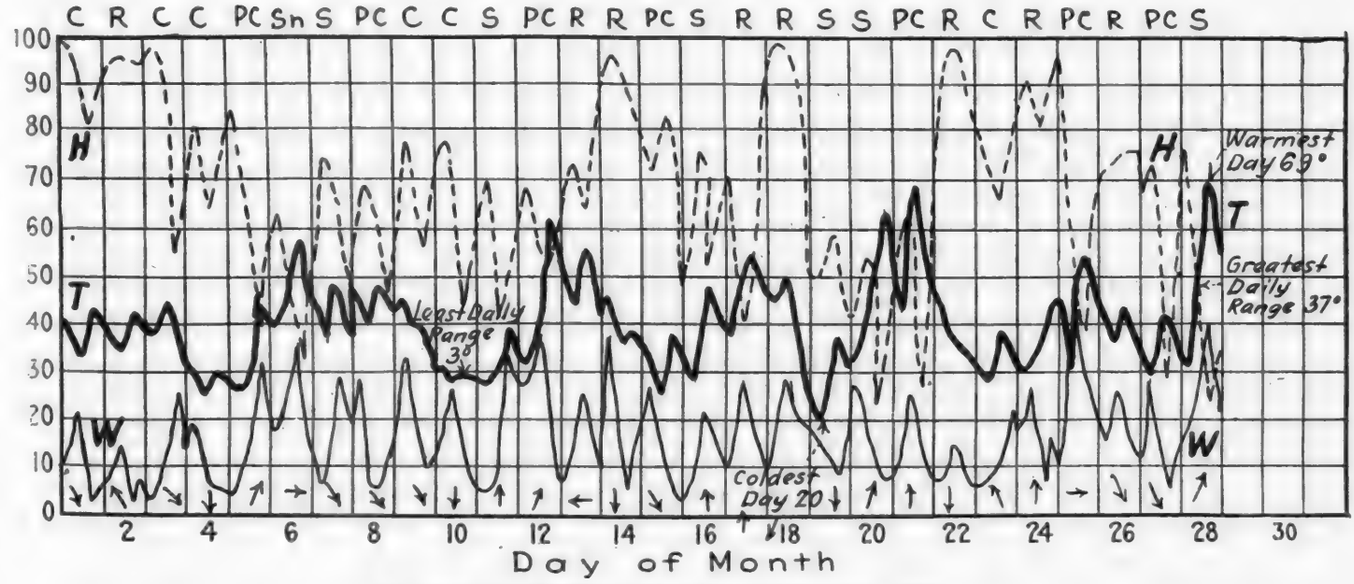
Least Daily Range 2°
Coldest Day 13°
Greatest Daily Range 25°
Warmest Day 28°
Day of Month

Record of the Weather in Chicago for February, 1926


C R C C PC Sn S PC C C S PC R R PC S R R S S PC R C R PC R PC S
H
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W
Least Daily Range 3°
Coldest Day 20
Warmest Day 69°
Greatest Daily Range 37°
Day of Month

Record of the Weather in St. Louis for February, 1926

Plotted from records especially compiled for THE HEATING AND VENTILATING MAGAZINE by the United States Weather Bureau. Heavy lines indicate temperatures in degrees F. Light lines indicate wind in miles per hour.
Broken lines indicate humidity in percentage from readings at 8 A. M., 12 M., and 8 P. M. Arrows fly with prevailing directions of wind.
S—Clear, PC—Partly cloudy, C—Cloudy, R—Rain, Sn—Snow.

Correspondence

Conditions Causing Water to Leave Boiler

EDITOR HEATING AND VENTILATING MAGAZINE:

Will you kindly let me know how to prevent the water leaving the boiler when the valves in steam lines supplying the apartments are closed or partly closed? This is done to keep the temperature in apartments below what is needed in the bath house.

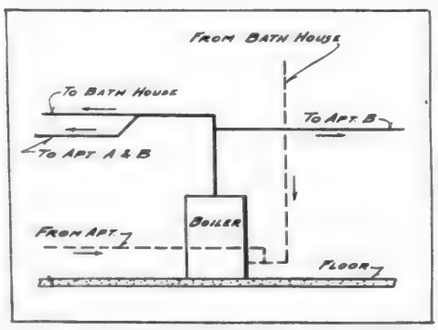
I have indicated the return pipes as clearly as my limited drawing power will permit. Four radiators in bath house and the radiator in our private bath and private bath in Apartment B drain into the return pipe from the bath house. This system is a single pipe, with steam pipes draining into return pipes. Piping seems sufficiently large to meet requirements.

If I placed a trap in each return pipe would that eliminate the difficulty? They would add additional resistance against the overflow of the water from the boiler in connection with the steam pressure. This is only a suggestion or idea.

Referring to water leaving the boiler when valves in supply pipes are turned off, or partly so, would say that the return pipe from the apartments is entirely below the water level in the boiler. Return pipe from the bath house for a distance of about 20 ft. is below water level. Balance of pipe lies pretty close to supply pipe. Could not drop it, there being not room.

Weehawken, N. J. F. STETZER.

Closing or throttling of the valve in the circuit to the apartment house introduces a resistance and a diminished supply, thus causing a greater drop in pressure than in any other circuit. In other words, the restriction by valve closure to the flow of steam lowers the pressure of the steam, as does also the condensing of the steam in the radiators faster than it can be supplied through the throttled valve. As a consequence, higher steam pressure acting downward on the water within the boiler forces out of the boiler and up into the return to this place of lower pressure. Water will then stand in the returns at some point above the boiler water line, the exact distance* depending upon the difference in boiler pressure and lowest pressure within the circuit in mind.



Sketch of Heating System in which Partial Closing of Valve in One Supply Circuit Caused Trouble

If the valves on each circuit are left fully opened the water should return from each circuit, backing up about the same height in each as determined by normal drop in steam pressure of each circuit due to length of run and condensation of steam in radiating surfaces. If, however, the trouble still occurs when all valves are wide open, it is a pretty fair indication that the boiler and system (especially if new) needs cleaning out in order to stop the water in the boiler from priming and foaming.

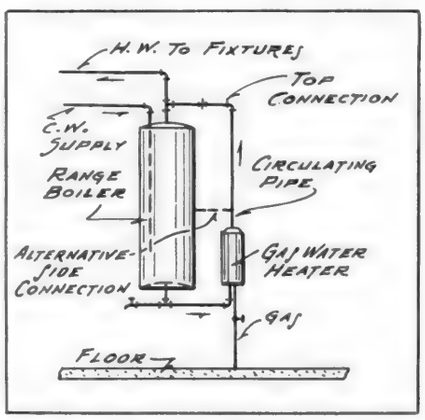


Fig. 1. Proper Connections for Range Boiler

Check valves placed in the returns of the throttled circuits would prevent the water from suddenly leaving the boiler through the corresponding returns whenever the stop valve of the circuit is throttled down. They would not prevent water from building up back of the check valves while the backward pressure of water from the boiler kept the flap of the check valve closed. During such times there would be a gradual lowering of the boiler water line, depending upon the rate of evaporation of water into steam. This steam would leave by the boiler steam outlet, pass on to the throttled circuits in which it would condense and accumulate in the corresponding returns until the pressure due to its height above boiler water line is great enough to open the flap of the check valve and overcome the steam pressure in the boiler. Of course, if the stop valve is throttled for such a short period of time that water does not leave the boiler to any serious extent, then the use of check valves in such circuits as now give trouble would answer the purpose and solve the difficulty.

*Approximately 28 in. for each pound of different pressure.

The purpose of the traps referred to by the correspondent is not very clear. It is evident, however, that they would only serve to increase the difficulties.

New York City. T. W. REYNOLDS.

Piping Connections for Water Tank Heater

EDITOR HEATING AND VENTILATING MAGAZINE:

Please inform me what is the best and most economical method of installing and piping a hot water tank heater for family use, gas being used for fuel.

Brooklyn, N. Y. T. A. D.

The best connections for range boilers are shown in Fig. 1 and for storage tanks in Fig. 2. The hot water supply should leave, of course, from the high point (See Fig. 2) and farthest from the entering cold water which should be at the opposite end and at the bottom. Circulating connections, hot and cold, are arranged according to the same reasoning.

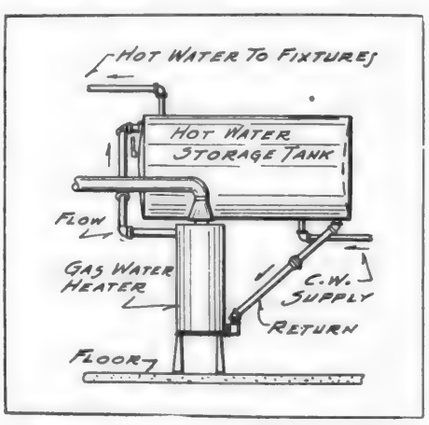


Fig. 2. Proper Connections for Hot Water Storage Tank

For range boilers the supply connections from the gas heater may be made to the side of the boiler as shown dotted. In this case some time must elapse after lighting the gas before the water is heated throughout, but if connected to the top of the range boiler, hot water can be delivered direct to the fixtures from the heater in a much shorter period of time. Hot water will be stored in the boiler almost as readily through the top connection as may be accomplished by means of the side connection.

An Improperly Designed Heating System

EDITOR HEATING AND VENTILATING MAGAZINE:

The water heating system in my home does not work properly, there being a first-floor hall radiator, also a second-floor radiator at the northeast corner which do not heat up. I find it necessary to keep "pushing" the heater in

order to get a little heat. In extreme weather my home is never warm.

The radiation was figured by an engineer of the heater manufacturer who also supplied the radiators, but did not supervise the job.

Jamaica, N. Y. LOUIS C. CUTOLO.

It is indeed unfortunate that so many water heating systems are wrongly installed, for once a system is in wrong it is a hard matter to state the minimum of the defects that may be remedied and yet make a workable system.

The foregoing is said as a prelude to consideration of a water heating problem, another job put in wrong, but unlike the one in the last issue of THE HEATING AND VENTILATING MAGAZINE where the method of making connections from the mains was too uniform. Here the size of risers is too uniform. In the other case the pipe sizes were too small, but in this case the pipe sizes are much too large (see Fig. 1). This occurs mainly in the case of the risers to the small radiators near the heater, resulting in short circuiting through such radiators and slowing up of the circulation to all radiators beyond these points.

The remedy for this condition is gradually to close the return valve of the near radiators until the circulation to such radiators is somewhat slowed up and thereby increased to the far radiators. If there is no return valve the throttling effect can be accomplished by inserting a 1-in. nipple in the union elbow at the return end of each rear radiator, this being a convenient point for the insertion due to the union end of the elbow.

In the case of the hall radiator, use a top supply connection at radiator, also a top connection from the main, not only because the radiator is at the far end of the main, but also because the radiator is a first-floor radiator. Such radiators have very little motive head for circulation, due to their slight elevation above the heater and should be favored in every way. The greater tendency is for the water to circulate to the radiators at higher elevations, as those on the second floor.

A sketch made as a result of a visit to the job is shown in Fig. 1. A study of this sketch will show that the heat transmission from radiators and heat losses from exposed building construction are about equal (as they should be), except in the hall where the radiation should have been doubled in amount. This increase in the amount of heating surface is necessary because of the heat losses caused by the outside door and flue effect of ventilating skylight above second floor.

Sizes of mains are correct, but size of branch to northeast corner could be bettered slightly by an increase of one pipe size. A number of the remaining branches and risers could have been made much smaller in size, as noted within circles in Fig. 1. This would have reduced the first cost and have produced better operation.

A check-up of this system shows an expansion tank too small (one 16 in. x 30 in. in size should have been used) and a chimney which in size will just about get by. The flue, being of tile, is really only 7¼ in. x 7¼ in. inside, whereas a 9.2-in. round, to be exact, should have been used. To obtain the equivalent effective area in a square chimney, the side of the square should equal the diameter of the round. It

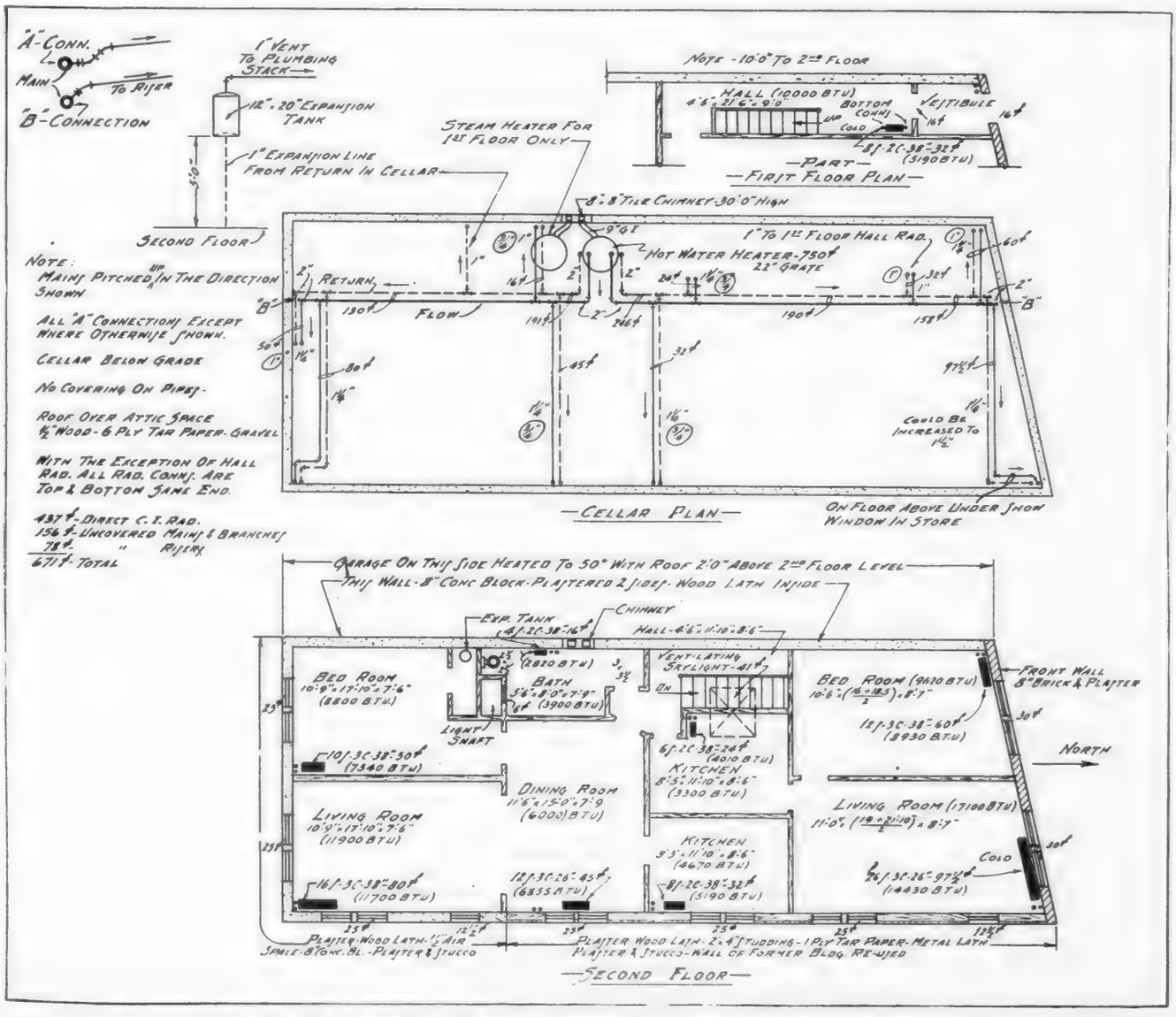

"A"-CONN.
MAIN
TO RISER
"B"-CONNECTION
1" VENT TO PLUMBING STACK
12"-20" EXPANSION TANK
1" EXPANSION LINE FROM RETURN IN CELLAR
SECOND FLOOR
STEAM HEATER FOR 1ST FLOOR ONLY
NOTE - 10'0" TO 2ND FLOOR
HALL (10000 BTU)
BOTTOM CONN.
VESTIBULE
8 1-2C-38"-32¢ (5190 BTU)
—PART— —FIRST FLOOR PLAN—
8"-8" TILE CHIMNEY-30'0" HIGH
HOT WATER HEATER-750¢ 22" GRATE
1" TO 1ST FLOOR HALL RAD.
RETURN
FLOW
NOTE:
MAINS PITCHED UP IN THE DIRECTION SHOWN
ALL "A" CONNECTIONS EXCEPT WHERE OTHERWISE SHOWN.
CELLAR BELOW GRADE
NO COVERING ON PIPES.
ROOF OVER ATTIC SPACE ½" WOOD-6 PLY TAR PAPER-GRAVEL
WITH THE EXCEPTION OF HALL RAD. ALL RAD. CONNS. ARE TOP & BOTTOM SAME END.
137¢-DIRECT C.I. RAD.
156¢-UNCOVERED MAINS & BRANCHES
78¢ " RISERS
671¢-TOTAL
COULD BE INCREASED TO 1½"
—CELLAR PLAN—
ON FLOOR ABOVE UNDER SHOW WINDOW IN STORE
GARAGE ON THIS SIDE HEATED TO 50° WITH ROOF 2'0" ABOVE 2ND FLOOR LEVEL
THIS WALL-8" CONC BLOCK-PLASTERED 2 SIDES-WOOD LATH INSIDE
EXP. TANK (4) 2C-38"-16¢
CHIMNEY
HALL-6'6"×11'10"×8'6"
VENTILATING SKYLIGHT-41¢
BED ROOM 10'9"×17'10"×7'6" (8800 B.T.U.)
BATH 5'6"×8'0"×7'9" (3900 BTU)
LIGHT SHAFT
BED ROOM (9670 BTU)
FRONT WALL 8" BRICK & PLASTER
12 1-3C-38"-60¢ (8930 B.T.U.)
NORTH
10 1-3C-38"-30¢ (7540 BTU)
6 1-2C-38"-24¢ (4010 BTU)
KITCHEN 8'5"×11'10"×8'6" (3300 BTU)
DINING ROOM 11'6"×15'0"×7'9" (6000) BTU)
LIVING ROOM 10'9"×17'10"×7'6" (11900 BTU)
LIVING ROOM (17100 BTU)
11'0"×19'2½"×8'7"
KITCHEN 9'3"×11'10"×8'6" (4670 BTU)
COLD
16 1-3C-38"-80¢ (11700 BTU)
12 1-3C-26"-45¢ (6835 BTU)
8 1-2C-38"-32¢ (5190 BTU)
26 1-3C-26"-97½¢ (14430 BTU)
PLASTER-WOOD LATH-½" AIR SPACE-8" CONC. BL.-PLASTER & STUCCO
PLASTER WOOD LATH-2"×4" STUDDING-1 PLY TAR PAPER-METAL LATH PLASTER & STUCCO-WALL OF FORMER BLDG. RE-USED
—SECOND FLOOR—

Fig. 1—Sketch of Water Heating System Which Does Not Function Properly

should not be less, nor should a chimney be less than 30 ft. in height. From this it will be seen that though the particular chimney under consideration may give a fair draft, it would have produced much better results and made the fire easier to regulate if made with the area required by the usual standards.

Connections at the same end of the radiators, as used in this case, are satisfactory, though some of the radiators are rather long for use with such connections. This does not matter so much as it would in a vacuum system where the greater pressure-differential short-circuits steam through the first few sections of the radiator, unless provisions are made by means of interior supply pipe as to overcome this condition.

The piping on this job was found minus covering, there being 156 sq. ft. of such radiating surface in mains and branches alone. About 75% of the heat lost from these surfaces could be saved by suitable covering. The risers in the stores and the vestibule should also be covered.

As the plans do not show all features of this installation it may be of interest to note that this building, which, incidentally, utilizes on the east the wall of a former building, contains two apartments on the second floor. The radiators in these two apartments, together with the radiator in the hall are connected to the water heating system, while the radiators in the stores on the first floor are heated by steam from a separate system.

Temperature Differences at Floor and Ceiling in Warm-Air Heating Systems

EDITOR HEATING AND VENTILATING MAGAZINE:

In the February number of the *Journal* A. S. H. & V. E., there is a report of the temperature conditions existing in the Research Residence as heated by a gravity warm-air system, which seems to confirm in a measure the comments by the writer in the October issue of THE HEATING AND VENTILATING MAGAZINE.

The writer in this article pointed out the inconsistency in heating and ventilating practice in the variation of points of heat delivery with different types of heating systems, i. e., steam radiators located on outside walls, as compared to warm-air registers on inside walls. If the outside wall is the correct location for the heat supply, and it appears to be, then the fact remains that warm-air registers should be similarly located. If this were the practice, then it would appear that the great temperature difference between floor and ceiling (17° at zero outside) as given in the report would not exist to such a great extent because the air as delivered along the outside walls would be cooler by the time it reached the ceiling than is now the practice. As now done, the air is directed from the inside walls clear across the room at the ceiling before its temperature is lowered by meeting the outside cooling surfaces (See Fig. 1.).

If this suggestion were followed out, it would seem that circulation in warm-air heating systems would be improved by travelling with the pressure or infiltration from windows (See Fig. 2), mingling with and tempering such cold air from the outside, hence raising the temperature at the floor line. Again, much or all of the infiltration, irrespective of its pressure, might under these conditions travel with the upward flow of heat from the warm-air registers (See Fig. 3), thus preventing the cold uncomfortable floor in warm-air heating systems (58° F. at zero outside) for which there is no preventative in present practice. Obviously, raising the temperature at the floor line and reducing it somewhat at the ceiling line would lower the temperature difference between floor and ceiling and thus improve air conditions within the rooms due to the more uniform temperature throughout.

As noted in the report, the temperature difference between floor and ceiling increased rapidly with the colder weather (from 7° at 35° F. outside to 17° at 0° F. outside), due to colder infiltration and effect of colder wall surfaces, a fact which seems to prove in a still greater measure that warm-air registers should be placed on outside walls, never on inside walls.

The author of the report also points out the importance of such data in computing heat losses through cold floor and ceilings. Commenting on this, it would seem to the writer that the report shows the unimportance of allowing for heat losses from floors in warm-air heating systems where the temperature is as low as 58° F. on the heated side and perhaps as high as 50° F. on the opposite side.

For some reason or other this phase of warm-air heating, cause of the temperature difference as reported and the possibilities of outside wall location, are neglected or lost sight of.

Formula Wanted for Computing Vacuum Heating Economy

EDITOR HEATING AND VENTILATING MAGAZINE:

Can you give us any suggestions regarding a reliable method of computing in a general way, the efficiency of a vacuum heating system, comparable to a gravity system? We realize that this question has very wide ramifications, but suggest that you elect a specific system of stated size and boiler temperatures and approximate the difference in efficiency.

MORTON MCI. DUKEHART & CO.
Baltimore, Md.

To forecast a definite degree of relative economy would be extremely difficult. So many varying factors enter into the problem that any discussion of this matter would at its best be but theoretical approximations. It would have been done long ago if practically possible.

There is the question of practical operation and control which is of considerably more importance, from an efficiency standpoint, than the theoretical considerations. The degree of vacuum can be varied to suit outside weather conditions and a considerable saving effected, yet while this is done in a measure, no operator will be found closely adhering to any such temperature schedule. A still further saving is effected if the matter becomes one of a power-plant proposition where higher back pressure on engines would be necessary with the gravity system to force steam through the system.

Vapor systems savings of 20% have been shown from certain tests as discussed in THE HEATING AND VENTILATING MAGAZINE, February, 1923, Pp. 37 and 40. Other phases of this matter were treated in the issues of October, 1924, P. 68 and January, 1925, P. 78.

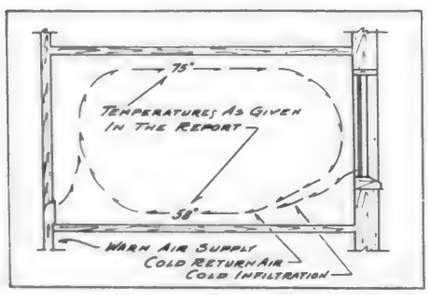


Fig. 1. Improper Circulation and Extreme Temperature Differences with Inside Location Warm-Air Registers

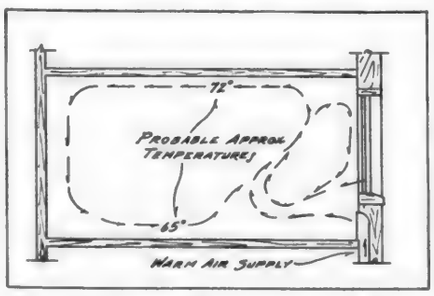


Fig. 2. Proper Circulation and Low Temperature Differences for Outside Location Warm-Air Registers

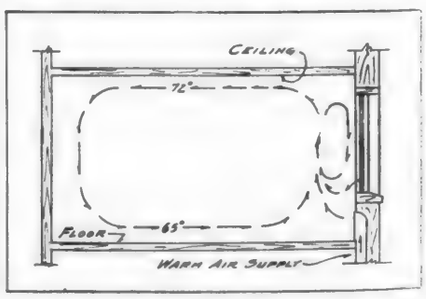


Fig. 3. Ideal Circulation with Outside Location of Warm-Air Registers

American Society of Heating and Ventilating Engineers

Society Establishes Department of Public Relations

IN a move to familiarize the public with the work and achievements of the heating and ventilating industry and, more particularly, of the American Society of Heating and Ventilating Engineers, the society, through its council, has announced the establishment of a Department of Public Relations. At the head of this department, the council has appointed P. E. Fansler, associate editor of THE HEATING AND VENTILATING MAGAZINE. Mr. Fansler's title will be Secretary of Public Relations.

P. E. Fansler,

Associate Editor of THE HEATING AND VENTILATING MAGAZINE, who has been appointed Secretary of Public Relations of the American Society of Heating and Ventilating Engineers.

Mr. Fansler will maintain his connection with THE HEATING AND VENTILATING MAGAZINE but will be released temporarily to carry out his work for the society. As Secretary of Public Relations he will make a study of and interpret the basic engineering principles involved in the heating and ventilation of buildings, with special reference to the scientific investigations conducted at the society's Research Laboratory, with a view of making the accumulated data available in a form useful to the profession and interesting to the public.

Mr. Fansler was graduated from Purdue University, class of '01, with a degree of B.S. in electrical engineering and, two years later, received the highest professional degree conferred by the university, that of electrical engineer.

For nearly 15 years he has been identified with the field of internal combustion engineering. Since his entry into the heating and ventilating field, he has made an intensive study of this subject, with special reference to domestic oil burning and gas heating. He is the author of "House Heating With Oil Fuel" and has contributed a number of important articles on heating and ventilating subjects to THE HEATING AND VENTILATING MAGAZINE, *Good Housekeeping* and *American Homes and Gardens*. Perhaps his most important single contribution to the science of heating is his Iso-Degree-Day Chart and similar derived charts on coal, gas and oil consumption for heating throughout the United States and Canada.

Mr. Fansler began his activities for the society March 15.

Winners Announced in Illinois Chapter's Heating Design Competition

Victor Walters, junior member of the Illinois Chapter, connected with the engineering department of the Illinois Central Railroad, was awarded first prize in the competition conducted by the Illinois Chapter for the best design of a two-pipe gravity direct water heating apparatus. The award was made at the March meeting of the chapter, held March 8 at the Hotel Sherman. The judges of the competition were C. E. Allen, W. Graves and Professor A. P. Kratz, of the University of Illinois.

Slides showing Mr. Walters' winning design were thrown upon the screen and Mr. Walters was interrogated by the members on features of his design.

Chairman W. A. Mertz, of the Illinois Chapter's Competition Committee, announced that second prize-winner was H. A. Birkholz, of the L. H. Prentice Company, and the third prize-winner, L. J. Pitcher, of the Illinois Engineering Company. Mr. Pitcher stated that it was his first attempt at designing a water heating system, adding that he had utilized the standard radiation estimating tables of the heating and Piping Contractors National Association and had consulted other authorities in laying out his system.

The prizes were donated by the Chicago branch of the American Radiator Company and consisted of gold coins in presentation boxes. The first prize was $40.00, the second, $30.00, and the third, $20.00.

Professor Kratz, in discussing the designs submitted, stated that on the question of reversed or direct return mains, it was his opinion that a direct return was best since this practically prevented short-circuiting. It was considered better practice, he said, to drain by having the supply main pitch up from the boiler, with the air valve located at the high point of the system. The return was necessarily pitched down and was usually 3/4 in. to every 10 ft.

These points, said Professor Kratz, were considered by the judges in making their decision. He stated also that the judges favored the larger pipe sizes. European practice, he said, provided for the extensive use of smaller pipes due to the fact that they are welded and hence smoother, but in the United States there is no question that the use of larger pipe sizes made for better installations.

Professor Kratz declared that the chimney size should be specified by the heating engineer or heating contractor and that this practice would eliminate a great amount of the trouble, now being experienced with heating systems, which could be traced directly to the chimney.

President Martin called attention of the members to the first two issues of the chapter's new periodical. It was voted to continue the publication for another two months on the present basis, that is, without advertising.

Before the meeting adjourned Robert H. Sexton was presented as the father of the "Own-Your-Home" movement. He referred to the forthcoming Own-Your-Home show then about to be held in Chicago and offered to donate the necessary space for showing the first prize heating design in the chapter competition.

Taking up the discussion of chimneys, Mr. Sexton related an experience in connection with the New York Own-Your-Home Show where some question arose as to the size of chimney which would be required to provide for the various oil burners used for demonstration purposes, all of which were connected to the same flue. Finally, he said, a guess was made that a 10-in. x 20-in. chimney would be the proper size. (As a matter of fact, however, the oil burners at the New York show were not allowed to operate, as the city's fire department would not permit oil to be stored on the premises, even in small quantities, not so much on account of the fire risk as on account of the danger of a panic in case of accident).

Mr. Sexton also spoke of the importance of educating the public in the necessity of insulating their homes. Architects, he said, do not give enough attention to the matter of insulation. This work should really be in the province of the heating engineer.

New members elected are: Ernest E. Ellis, Fred Ellis & Son, Winnetka; Walter C. Ellis, consulting engineer, Chicago; and Lester Seelig, Drying Systems, Inc., Chicago.

Appointment of Standing Committees

The following standing committees of the A.S.H. & V.E. have been appointed by Professor William H. Driscoll:

EXECUTIVE
F. Paul Anderson, chairman
J. A. Cutler
A. C. Willard

FINANCE
Thornton Lewis, chairman
E. B. Langenberg
J. F. McIntire

MEMBERSHIP
W. E. Gillham, chairman
C. V. Haynes
W. T. Jones

PUBLICATION
S. E. Dibble, chairman
F. Paul Anderson
W. H. Carrier

Western New York Chapter Takes Up Building Insulation

"Building Insulation—the Ally of the Heating and Ventilating Engineer" was the main subject for discussion at the March meeting of the Western New York Chapter held at the Hotel Buffalo, New York, March 1.

The speaker of the evening was E. C. Lloyd of the Armstrong Cork and Insulation Company, Pittsburgh. Mr. Lloyd discussed the subject under the headings of insulation generally, cork as an insulating material, application of cork insulating to dwellings, and how it influences the flow of heat from the building and uniformity of heating, specific records of heating plant performances on insulated and uninsulated houses, and roof insulation.

Among the guests were Homer Linn of Chicago, who gave a glowing report of building prospects on the Pacific coast, and Edward B. Green a Buffalo architect, who discussed problems of construction in apartment houses.

New York Chapter Discusses Window Ventilation

Echoes of the open-window ventilation symposium at the Buffalo meeting of the A.S.H. & V.E., together with further views on the subject, were heard at the March meeting of the New York Chapter which was held at the Building Trades Club, New York, March 15.

An unusually large gathering greeted the speakers who included President William H. Driscoll of the society, Dean Anderson, vice-president; Perry West, James A. Donnelly, Albert L. Baum, Walter L. Fleisher, J. I. Lyle and Dwight D. Kimball, former president of the society and a member of the New York State Commission on Ventilation.

R. H. Carpenter, the nominee for president of the chapter, had charge of the meeting. The discussion held the close attention of those present until a late hour.

President Driscoll in his talk quoted from the proceedings of the society to show that formerly Dr. Winslow was an advocate of mechanical ventilation. He felt that the present agitation for open-window ventilation could be compared to a proposal to revert to backyard wells in place of a modern water supply. The most important step now before the society, he felt, is to secure conclusive evidence on the subject. In Rochester, he said, an opportunity has been offered to make field tests in two schools of similar design, one equipped with mechanical ventilation and the other with open-window ventilation. The society has accepted an offer to cooperate with the American Public Health Association in an investigation of these two schools which will continue for a period of at least a year.

Dean Anderson expressed his amazement that the open-window enthusiasts could advocate such uncertain methods, in view of the fact that the work at the society's Research Laboratory in Pittsburgh had fixed the required air conditions for comfort and health. Window ventilation, he declared, in the nature of things, cannot at all times meet any standard of ventilation.

Perry West presented again some of the cost data contained in his address at the Buffalo meeting in the way of additional radiation required, the increase necessary in the cubic space and, consequently, in the cost of buildings with window ventilation. As regards operation, he quoted from a study made of 70 Newark schools during a ten-year period. For the first three years, the mechanical plants were all in operation. When the war was on, the fans were shut down, and since that time have not been operated to any extent. The comparative yearly coal figures were found to be 6.7 tons per classroom with mechanical ventilation, and 6.3 tons per classroom with no special means of air supply. He deduced from this that if the windows had been opened, the fuel costs would have exceeded those of fan-ventilated schools. The saving in electricity for the motors, he estimated at $15.00 per building per year.

While the total cost of operating school buildings ranges from $75.00 to $100.00 per pupil per year, the cost of operating the mechanical fan systems runs from $2.00 to $3.00 per pupil per year. He advocated the collection of field research data, including statistics on the effects of window ventilation on health and longevity, and the inauguration of better co-operation within the industry itself, and the establishment of an agency to co-ordinate the activities in the mechanical equipment field.

James A. Donnelly offered, as his main contention, that the industry should work for provisions in the existing requirements covering the proper operation of heating and ventilating plants. In a previous cycle of window ventilation, he showed how the efforts in that direction had evolved back to mechanical ventilation methods.

Walter L. Fleisher expressed the thought that one reason for the favorable consideration of window ventilation may be due to the fact of the varying temperatures secured with this method. He thought the heating industry could take a leaf from this by providing for intermittent operation of ventilating system with warm and cool air to avoid the deadly monotony of uniform temperatures.

Although not among the scheduled speakers, Dwight D. Kimball had some interesting comments to make on the statements of the previous speakers. After announcing that he was not personally an advocate of window ventilation, he asked how many of those present had ever been in an "accepted" window ventilated school? No hands were raised. "In that case," he declared, "how can one say what effects are actually secured by this method?" It is a fact, he added, that no field observations have been made justifying the present legal requirement of 30 cu. ft. More failures in fan ventilation, he stated, had come through operation than design, although design was responsible in a great measure for the prejudice

existing in the minds of school officials. He agreed that the radiation is doubled with window ventilation.

On the subject of costs he stated these run from 4 to 5c per cubic foot with mechanical ventilation, and from 2 to 3c per cubic foot with window ventilation. As far as the construction costs are concerned, his experience indicated that these were not increased nor is the space per pupil in the classroom increased. The classroom with either system is of the same size.

J. I. Lyle spoke of the psychological effect of the open window, while A. A. Cary advocated a renewed study of the benefits of ozone.

Mr. Richardson, who is connected with the New York school building department, declared that regulation was the chief problem involved. Frank G. McCann supported this statement and declared that with outdoor temperatures below 40° there is no extra cost of mechanical ventilation in comparison with opening the windows.

As regards saving money with natural ventilating systems and uncertain air conditions, the cost of the "repeating child" who fails in his studies is a factor that might easily balance any saving made. He thought the important thing to be done was to educate the custodians, teachers and boards of education in the proper operation of mechanical heating and ventilating systems.

Michigan Chapter Hears Talk on Air Conditioning

D. C. Lindsey, of the Carrier Engineering Corporation, was the principal speaker at the March meeting of the Michigan Chapter, held at the Detroit Engineering Society Building, Detroit, March 16. Forty-seven members and guests were present.

Mr. Lindsey discussed the need of air conditioning in textile, tobacco, candy and other industrial plants, to maintain uniformity of product and continuity of operation. He showed also how theatres suffer tremendous losses financially, due to improper air conditions, and he cited numerous cases where theatre patronage was doubled during the summer months over previous years, due to proper air cooling. He emphasized the tremendous future for air conditioning apparatus in department stores, schools, hospitals, apartments and other buildings.

L. L. Smith, of Smith, Hinchman & Grylls, told of the obstacles to be overcome in connection with the air conditioning equipment in the basement and sub-basement of the J. L. Hudson department store, in Detroit.

W. L. McGoldrick, vice-president of the Oil Burning Engineering Company of Detroit, was the principal speaker at the February meeting of the Michigan Chapter, held in Detroit, February 15. He expressed the opinion that the wide use of oil as fuel is inevitable. In his experience, he said, oil burning is less economical on single-pipe steam installations than on some others.

He advocated the use of burners handling heavy oils, but burners he said, should be designed to use all grades. Complaints due to noise and vibration are received from 35% of all customers. Boilers used with oil burning, in his judgment, should be 30% oversized. Service calls from 1500 installations average about 40 a day.

In the discussion it was brought out that the lack of accurate knowledge of oil heating on the part of the salesmen is a detriment to the business.

Mr. McGoldrick was followed by G. P. Gregg, assistant safety engineer of Detroit, who told of the experiences of his department in investigating oil-burner problems. He emphasized the importance of equipping oil burners with automatic devices to maintain the water level of the boiler.

Ontario Chapter Discusses Heating Problems

Some idea of the problems commonly met with in heating practice is given in the subjects for discussion which were outlined at the February meeting of the Ontario Chapter. These subjects were:

1. Does water leave a steam boiler by the outlets?
2. What causes water to leave a steam boiler.
3. What effect does dirty water in a steam boiler have on the efficiency and operation of a steam heating system?
4. How should a dirty steam boiler be cleaned?

Vice-President A. J. Dickey was in the chair. Among the guests was Reuben Trane, president of Trane Company, La Crosse, Wis., who gave details of the A.S.H. & V.E. meeting in Buffalo. As a result of the discussion on the disadvantageous effect of dirty water in steam boilers it was voted to appoint a committee to collect data and to compile a standard code covering the cleaning of steam heating boilers.

Programs for subsequent meetings were announced as follows: March: "Pipe Sizes for Steam Heating" introduced by H. H. Angus and M. F. Thomas. April: "Warm Air Furnace Heating" introduced by R. J. Miller and G. T. Wilson. May: General discussion of A.S.H. & V.E. "Guide."

Minneapolis Chapter Discusses Distribution

John Howatt, chief engineer of the Chicago schools; Samuel R. Lewis, consulting engineer of Chicago; and A. B. Martin, representing the Kewanee Boiler Company in Chicago, were guests of the Minneapolis chapter at its February meeting. The occasion was a joint meeting with local members of the A.S.M.E.

Mr. Lewis spoke on the subject of distribution. He was followed by Mr. Howatt who had been inspecting the schools in Minneapolis. He found them excellently equipped and was warm in his praise of the Minneapolis school building department.

Pittsburgh Chapter Inspects Power Plant

An inspection of the Cecil plant, which was arranged by Mr. Gunther of the Allegheny County Steam Heating Company, was a feature of the February meeting of the Pittsburgh chapter.

This plant contains two of the largest boilers in the world, rated at 3275 H.P. each, and designed to develop 12,000 H.P. each at peak loads. The boilers are fired with pulverized coal.

Subjects for subsequent meetings were announced as follows:

March, "Theatre Heating and Ventilating," speaker W. H. Carrier; April, "Steam Heat"; May, "Round table on sick jobs and cures."

Virginia Adopts Amended Ventilation Law

The Virginia legislature has passed its proposed new ventilation, with some amendments. The text of the law, as proposed, was published in last month's issue. The change in the act, as finally passed, is the specification of 175 cu. ft. of air space per pupil, instead of 200 cu. ft., and the provision that, in lieu of the 30 cu. ft. standard "a system of ventilation requiring less than 30 cu. ft. of pure air per minute per pupil, but in no case less than three air changes per hour, may be adopted by the State Board of Education, subject to the approval of the State Board of Health, and the division superintendent may be authorized to approve such plans of ventilation."

Heating Course Given in Newark, N. J.

A heating course for architects, heating and piping contractors and their employes is being conducted by the Educational Department of the Y.M.C.A., in Newark, N. J., at 107 Halsey Street. The instructor is Allen P. Livar, a heating engineer and manager of the New Jersey branch of the Trane Company.

The course commenced March 19. It comprises 16 lessons of 1½ hours each. Meetings are held on Tuesday and Friday evenings for a period of eight weeks. Both steam and water heating are covered, as well as fuels and combustion, and the principles of ventilation. This is the second course conducted by Mr. Livar, the first, which has just been successfully completed, having commenced January 5. Twenty-five men comprised the first class.

American Oil Burner Association

Full Program of Oil Burner Convention

IN anticipation of a record-breaking attendance and with an array of exhibits overflowing the allotted space, requiring the use of a second exhibit hall, the American Oil Burner Association arranged an elaborate program for its third annual convention, in Detroit, Mich., April 6, 7 and 8. The headquarters for the meeting and the exhibit halls are in the Book-Cadillac Hotel.

Following is the tentative program:

TUESDAY MORNING, APRIL 6

9:00—Registration.

10:00—Meeting of Board of Directors.

TUESDAY AFTERNOON, APRIL 6

1:30—General meeting in Crystal Ballroom. Opening remarks by President C. H. Chalmers, president, Chalmers Oil Burner Company.

2:00—"The Needs of Oil Burning—A Report and a Forecast," by Executive Secretary Leod D. Becker.

2:30—"Some Reflections on Research in Oil Combustion and Carbon," by C. F. Kettering, president, General Motors Research Corporation.

3:00—"Our Petroleum Resources," by R. L. Welch, general counsel, American Petroleum Institute.

3:30—"The Road to Progress," by C. F. Olmstead, technologist, American Oil Burner Association.

4:00—"More Courage and Better Salesmanship," by C. U. Williams, chairman of the board, Williams Oil-o-matic Heating Corporation.

4:30—Open Forum Discussion.

5:00—Annual business meeting of the association.

TUESDAY EVENING, APRIL 6

8:00—"Detroit Night," reception and dance in Crystal Ballroom, the Oil Burner Association of Michigan acting as host.

8:00—Radio address on oil burning, by Edward P. Bailey, treasurer, National Airoil Burner Company, broadcasting from Station WJR, Book-Cadillac Hotel. Also "Detroit Night" in the exhibit halls, with admission by card to invited guests, including architects, building contractors, engineers, industrial plant executives and a limited number of Detroit home owners.

WEDNESDAY, MORNING, APRIL 7

9:00—"Sales Ammunition," by Andrew H. Melville, director of research, Condé Nast Publications, Inc.

9:30—"The Place of Oil Burning in Industry," by Dr. Howard C. Parmelee, editor-in-chief of *Chemical and Metallurgical Engineering*.

10:00—"How Associations Have Increased Sales Through Co-Operative Advertising," by J. J. O'Donnell, sales manager, William Green Corporation.

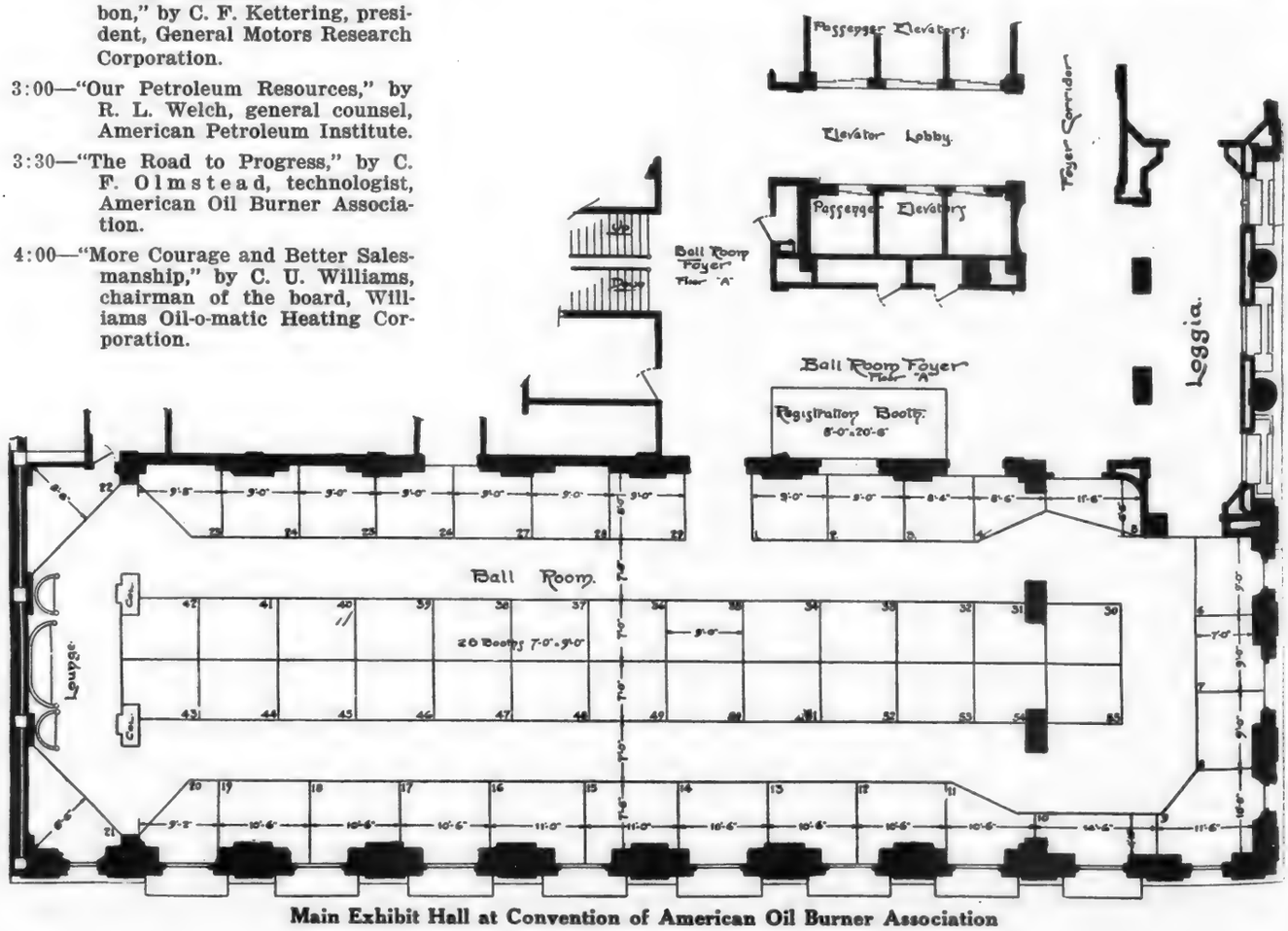
10:30—"How the American Oil Burner Association's Advertising Campaign Will Work," by Executive Secretary Leod D. Becker.

11:00—Discussion, following which applications will be received to participate in the Oil Burning Institute's advertising campaign.

WEDNESDAY AFTERNOON, APRIL 7

3:00—"The Natural Draft Burner—Its Place in the Industry," M. E. Simpson, general manager, Northern Machinery Company.

2:30—"Building the Dealer Sales Organization and Getting Sales Volume," by C. Van Mannen, secretary-treasurer, Oil Burning Engineering Company.



Main Exhibit Hall at Convention of American Oil Burner Association

3:00—"Manufacturers and Dealers—Friends or Foes?" by M. J. Binkley, vice-president, Calor-oil Burner Corporation.

3:30—"The Significance and Trend of Oil-Fuel Specifications," by W. H. Camp, general superintendent, Empire Refineries.

4:00—"Oil Deliveries and the Possibilities for a Central Service Depot," by William A. Cahill, Cahill Oil Company.

4:30—Open Forum.

5:00—Organization meeting of the Dealer Division of the association, open to all distributors and dealers.

7:00—Annual banquet in Crystal Ballroom. Address, "The Constitution Among Friends," by Past President Edward P. Bailey.

THURSDAY MORNING, APRIL 8

9:00—"The Influence of Intermittent Firing on Efficiency," by James L. Breese, Jr., president Breese Engineering Company.

9:30—(Speaker to be announced).

10:00—"What Is the Use of Oil Burners?" by Carl J. Fink, assistant director of research, American Radiator Company.

10:30—"Metal Hose and Its Place in Oil-Burner Equipment," by C. W. Fletcher, president, Tite-Flex Metal Hose Company.

11:00—"The High Points of This Convention," by Lionel L. Jacobs, vice-president, Fess Oil Burners of Canada, Ltd., Toronto, Ont.

11:30—Open Forum.

Thursday evening, an informal entertainment has been arranged by the Oil Burner Dealers' Association of Michigan.

List of Exhibitors

Nearly 100 of the leading manufacturers of oil burners, oil-burning equipment and accessories are represented with exhibits. A total attendance of 1200 manufacturers and dealers is expected. Following is the complete list of exhibitors:

Booth	Exhibitor	Exhibits
1	Wayne Tank and Pump Company, Fort Wayne, Ind.	Oil burners
2	Bockfinger and Cass, Chicago, Ill.	Incinerators
3	Monitor Boiler Company, Philadelphia, Pa.	Boilers
4	American Machine & Foundry Company, Brooklyn	Pumps
5	Michigan Tank and Galvanizing Co., Detroit	Tanks
6	Titeflex Metal Hose Co., Newark, N. J.	Metal hose
7–8	Leader Iron Works, Decatur, Ill.	Tanks
9–10–11	Honeywell Heating Specialties Co., Wabash, Ind.	Temperature controls
12	The Heating and Ventilating Magazine, New York	Publication
13	Breese Engineering Corp., Chicago, Ill.	Boilers and burners
14	Northern Machinery Co., Minneapolis, Minn.	Oil burners
15	The Waterman-Waterbury Co., Minneapolis, Minn.	Furnaces
16	May Oil Burner Corp., Baltimore, Md.	Oil burners
17	Webster Electric Co., Racine, Wis.	Ignition devices
18	Petroleum Heat & Power Co., New York	Oil burners
19	Sharpsville Boiler Works Co., Sharpsville, Pa.	Tanks
20-21	S. T. Johnson Co., Oakland, Calif.	Oil burners
22	McDonnell & Miller, Chicago, Ill.	Feed-water controls
23–24	Super Oil Heater Co., Hartford, Conn.	Oil burners
25	Absolute Con-Tac-Tor Corp., Beloit, Wis.	Temperature controls
26–27–28	Minneapolis Heat Regulator Co., Minneapolis, Minn.	Temperature controls
29	Fuel Oil, New York	Publication
30	W. B. Wilde Co., Peoria, Ill.	Oil burners
31	Lennox Furnace Co., Marshalltown, Ia.	Furnaces
32	Commonwealth Engineering Co., Chicago, Ill.	Oil burners
33	J. E. Grady Co., Detroit, Mich.	Oil burners
34–35	Aetna Automatic Oil Burner, Inc., Providence, R. I.	Oil burners
36	The Federal Gauge Co., Chicago, Ill.	Temperature controls
37–38	Home Appliance Corp., St. Louis, Mo.	Oil burners
39–40	W. S. Ray Mfg. Co., San Francisco, Calif.	Oil burners
41	Jefferson Electric Mfg. Co., Chicago, Ill.	Ignition devices
42–43	Cook Electric Co., Chicago, Ill.	Pumps and gauges
44	Teesdale Mfg. Co., Grand Raids, Mich	Pumps
45–46	The Beckwith Co., Dowagiac, Mich.	Oil burners
47	Bryan Steam Corp., Peru, Ind.	Boilers
48	American Blower Co., Detroit, Mich.	Blowers
49	Dooley & Braden Co., Rock Island, Ill.	Oil burners
50	Home Incinerator Co., Milwaukee, Wis.	Incinerators
51–52	Combustion Fuel Oil Co., Milwaukee, Wis.	Oil burners
53	Keystone Refractories Co., New York	Refractories
54	Bunting Iron Works, Berkeley, Calif.	Oil burners
55	Janette Mfg. Co., Chicago, Ill.	Motors and pumps
56	American Radiator Co., Chicago, Ill.	Boilers
57	Milwaukee Tank Works, Inc., Milwaukee, Wis.	Tanks
58	Dongan Electric Mfg. Co., Detroit, Mich.	Transformers and ignition devices
59	The Crosley Radio Corp., Cincinnati, O.	Oil burners
60	Marr Oil Heating Machine Corp., Minneapolis, Minn.	Oil burners
61	The Electro-Alloys Co., Elyria, O.	Thermalloy castings
62	General Necessities Corp., Detroit, Mich.	Refrigerators
63	Motor Improvements, Inc., Newark, N. J.	Oil filters
64	The Boston Auto Gage Co., Pittsfield, Mass.	Tank Gages
65	Basel Mfg. Co. Inc., Kansas City, Mo.	Valves and regulators
66	Wm. J. Foley Co., Denver, Colo.	Boiler coils
67	Automatic Home Heating Co., Pueblo, Colo.	Oil burners
68	The McAlear Mfg. Co., Chicago, Ill.	Feed-water controls
69	Silent Automatic Corp., Detroit, Mich.	Oil burners
70	Copeland Products, Inc., Flint, Mich.	Refrigerators
71	The Meyer Furnace Co., Peoria, Ill.	Furnaces
72	Simplex Oil Heating Co., Providence, R. I.	Oil burners
73	Automatic Hydro Oil Burner Co., Detroit, Mich.	Oil burners
74	Wagner Electric Corp., Chicago, Ill.	Electrical equipment
80	Super Heat Oil Burner Co., Muskegon, Mich.	Oil burners
82	W. H. Kratzer Co., Detroit, Mich.	Furnaces

Latest Additions to List of Approved Oil Burners

The following additional oil burners, it is announced, have been "listed" as of April 1, by the National Board of Fire Underwriters:

May "Type L" Domestic Oil Burner. May Oil Burner Corporation, Baltimore, Md.

Mechanical draft oil burner with a. c. motor drive. Temperature control—automatic or manual. Ignition—electric (transformer) or manual. Fuel—kerosene, distillate or fuel oil, not heavier than 32° A. P. I. Fuel feed—suction from supply tank to oil pump on burner, and pressure from oil pump to atomizing nozzle. Designed for hot water, steam and hot-air installations. Marking: "Type L" on etched name plate attached to blower housing, and "Type B" on Honeywell stack control. (This card replaces card dated May 19, 1925).

Walker "Type 1000-S" Domestic Oil Burner, Walker Oil Burner Corporation, St. Louis, Mo.

Natural draft oil burner. Temperature control—manual. Ignition—manual. Fuel—kerosene or distillate not heavier than 38° A. P. I. Fuel feed—gravity. Designed for hot water, steam or hot air installation. Marking: "Type 1000-S" on etched name plate attached to Imperial "Type No. 185H" control valve; also cast on air manifold castings.

Hart "Type C" Domestic Oil Burner, W. B. Wilde Co., Peoria, Ill.

Mechanical draft oil burner with a. c. motor drive. Temperature control—automatic. Ignition—gas pilot, electrically ignited or electric (transformer). Fuel—fuel-oil not heavier than 28° A. P. I. Fuel feed—suction to oil supply pump mounted on burner. Designed for hot water, steam and hot-air installations. Marking: "Type C" cast as integral part of name plate attached to main burner cover.

(This card replaces card dated Sept. 22, 1925).

Super "Type B" Domestic Oil Burner. Super Oil Heater Company, Hartford, Conn.

Mechanical draft oil burner with a. c. motor drive. Temperature control—automatic. Ignition—gas pilot. Fuel—oil fuel not heavier than 36° A. P. I. Fuel feed—gravity feed to carburetor unit. Marking: "Type B" on etched name plate attached to carburetor housing, and "Type B" on Honeywell stack control.

Williams "Model I" Industrial Oil Burner. Williams Oil-O-Matic Heating Corporation, Bloomington, Ill.

Mechanical draft oil burner with a. c. or d. c. motor drive. Temperature control—manual. Ignition—manual. Fuel—fuel oil not heavier than 28° A. P. I. or Diesel oil (Pacific Coast) not heavier than 25° A. P. I., having a flash point not heavier than 170° F., a viscosity of

54 sec. (Saybolt-Universal at 100° F.) and a pour point not higher than minus 10° F. Fuel feed—gravity or suction to metering pump, pressure from pump to combustion chamber. Designed for steam and hot-water installations where burners having single pumps are permitted. Marking: "Model I" on etched name plate attached to motor housing.

Atlas "Model A" Domestic Oil Burner, Atlas Oil Burner Co., Chicago, Ill. Natural draft oil burner. Temperature control-Manual. Ignition-Manual. Fuel-Kerosene or distillate not heavier than 37° A. P. I. Fuel Feed-Gravity. Designed for installations having a minimum draft of not less than 0.1 in. water column. Marking: "Model A" on etched name plate attached to control valve, also cost on burner bowl and air manifold castings.

New Air Conditioning Firm

A new air conditioning firm under the name of S. C. Bloom & Co., of Chicago, has entered the field. Mr. Bloom has acquired the Webster brine spray; also the brine spray refrigeration and packing house air conditioning business, formerly handled by the Atmospheric Conditioning Corporation. Mr. Bloom was formerly vice-president and western

S. C. Bloom

Head of the New Air Conditioning Firm of S. C. Bloom & Company.

manager of the Atmospheric Conditioning Corporation and then special branches were developed by Mr. Bloom prior to and during this association.

He early recognized the fertile field for applying the principles of air conditioning, in which he has been engaged for fifteen years, to the many refrigeration and humidity control problems of the meat packing and cold storage industries.

The new company will handle the Webster line of air washers and a line of refrigeration specialties including the Hillger No-Freeze back-control valve, and three-pressure defrosting system. With this system, it is stated, it is possible to eliminate the shortcomings of direct-expansion systems of applying refrigeration. In addition, the company will manufacture several articles of allied equipment, designed and perfected by Mr. Bloom.

Mr. Bloom, as an individual, will do consulting work in refrigeration and air conditioning, including ventilation, humidity control, cooling and drying. K. E. Wolcott, long connected with Armour and Company, and intimately acquainted with packing house requirements, is associated with Mr. Bloom as chief engineer of the company.

Mr. Bloom is a member of a number of engineering organizations—he served two years as president of the Chicago section of the American Society of Refrigerating Engineers—and is the author of numerous technical articles on brine spray refrigeration and air conditioning.

The changes here noted are the outgrowth of the purchase of the Atmospheric Conditioning Corporation by the Carrier Engineering Corporation of Newark, N. J.

A Classic in Fuel and Combustion Literature

"Fuels and Their Combustion," by Haslam and Russell, is a distinct contribution to engineering literature and, in view of its timeliness and character, fills a real need in an infant industry. While only two of the twenty chapters deal specifically with oil fuels, there are five additional chapters that make up a complete story of the phenomenon of combustion of petroleum fuels.

A rare property of the book is its extreme readability, which is in marked contrast to the conventional technical publication. From the executives in the oil burner industry, down through the district sales managers and salesmen, to those engaged in installation and service work, there is scarcely an individual who might not profit from a study of this book, as even the section treating of combustion reactions has been so beautifully handled as to be readily grasped by a non-technical reader.

The volume is the outgrowth of a lecture course by Robert T. Haslam, professor of chemical engineering, and Robert P. Russell, assistant professor of chemical engineering, at the Massachusetts Institute of Technology. Following a survey of the fuel situation, a chapter on the origin and composition of coal leads to a discussion of types of coal, and their classification. There follows a study of coal resources and coal production in the United States, with a chapter on spontaneous combustion and storage of coal. Petroleum, its composition, geology, and properties, and the petroleum resources of the United States and Mexico account for a chapter.

"All the various complex fuels may be considered as mixtures of three simple or elementary fuels: (1) solid carbon, (2) gaseous hydrocarbons, and (3) a mixture of carbon monoxide plus hydrogen." Thus the authors preface the chapter on the combustion of the elementary fuels, and there follows a lucid presentation of a method of formulating combustion calculations. The properties and combustion of gaseous fuels leads, naturally, to the specific application of gas to heating, but this and a later chapter on the combustion of fuel oil are rich in information that is of value to those engaged in selling or handling domestic oil burners.

Coal, as a fuel, is comprehensively handled in chapters dealing with the combustion of coal on grates; the operation of hand-fired furnaces; mechanical stokers and furnaces, and powdered coal. There are two chapters dealing with producer gas, water gas and oil gas. One on furnace efficiency and the distribution of heat losses is of general interest.

An unusually comprehensive bibliography is presented, related tabulations following each chapter, with reference indices throughout the text, so that fundamental sources of data are always evidenced. Fuels and Their Combustion is published by McGraw-Hill Book Company, Inc., New York. Pp. 810. Price, $7.50.

SIX STEPS IN BUILDING OR BUYING A HOME is an interesting pamphlet issued by the American Construction Council. This pamphlet gives suggestions on the more important items which should be kept in mind when buying or building a home. It has been prepared by the Better Building Committee of the council, after a national survey of conditions, and in consultation with over forty representatives of all branches of the construction industry, including public officials.

The "Six Steps" are captioned as follows:

1. Secure a proper location for your house.

2. Decide what type of house you want.

3. Give careful thought to the layout of the house.

4. Go to a reliable architect and have him prepare the general plans and specifications for the house.

5. Do not agree to any plans and specifications or to any other contract until you have consulted with your local financing organization.

6. After making sure of the approval of your loaning agency and your architect employ a thoroughly reliable building contractor.

The booklet contains much valuable information gathered into little space. It is 8½ x 11 in. Pp. 8, and may be had for 10c per copy from the American Construction Council, 28 West 44th Street, New York.

AN INVESTIGATION OF CERTAIN METHODS FOR TESTING HEAT INSULATORS by E. F. Grundhofer, is the title of Bulletin No. 33, issued by the Engineering Experi-

ment Station of the Pennsylvania State College. This bulletin contains a description of four methods of testing low-temperature heat insulators that have been used successively at the Engineering Experiment Station of the Pennsylvania State College. It also contains an analysis of the results obtained and a final summary of the methods.

Several forms of test boxes were compared, and the comparisons show that the "guarded plate heater" gives the lowest conductivity values for a given material, and also gives the smallest percent increase in conductivity with increase of mean temperature of the material. The other methods follow in order: "Cubical heater test box," "cubical test box" and "Postal Department test box." Corkboard blanks of the same density and from the same shipment were used as the test material.

The conclusion of the summary is that the "guarded plate heater" is the best method employed here, and that the "cubical heater test box," the "cubical test box" and the "Postal Department test box" follow in order.

The appendix contains thermal conductivities of a few materials, secured on the "guarded plate heater," and an extended bibliography which has been revised and enlarged from the bibliography contained in Bulletin No. 30 of this Station.

This 72-page bulletin may be had from the Pennsylvania State College, State College, Pa. Price 25c.

TESTS OF HOUSEHOLD FUEL SAVERS AND THE ECONOMICAL USE OF COAL, by Professor F. G. Hechler, is the subject of Engineering Experiment Station, Bulletin No. 34 of the Pennsylvania State College. The tests that form the basis for the major part of this bulletin apparently were the results of activities on the part of manufacturers of so-called "fuel savers" throughout the State of Pennsylvania.

It is estimated by the author of the bulletin that the annual consumption of coal for domestic heating purposes in the State is in the order of 8,000,000 tons, so that if the fuel savers could actually effect the minimum advertised saving of 10%, the annual savings to the citizens of the State would amount to about $8,000,000. As manufacturers of "fuel-savers" claim that the use of their devices will save from 10% to 50% of the fuel, it becomes evident that if their assertions are in any degree true, tremendous aggregate economies might be effected through their use. As the bulletin states, "the claims made for these devices are most alluring and the testimonials presented are most convincing."

The bulletin particularly draws attention to the fact that nearly all of these manufacturers and their representatives quote portions of United States Government publications in order to prove the correctness of their theory. In many cases, however, only such phrases are quoted as will support their contentions and other relevant matter is omitted entirely. It is evident from a description of the method in which the tests were conducted that every effort was made to insure fairness. The manufacturers of the several devices tested were invited to supply their device and to have a representative make such adjustment as would insure its operation under reasonably favorable conditions. One manufacturer declined to co-operate on this basis, expressing the fear that the Engineering Experiment Station would not reproduce the inefficiency of the average home heating plant.

Records were taken with both indicating and recording instruments, and some of the tests continued as long as 22 hours. Previous to the test, and supplementary thereto, a test of the furnace alone was made with an uninterrupted run of three weeks.

The apparent inability of the fuel savers to effect any reduction of the percentage of ash is shown in the result of a test of the best equipment. In this case, the weight of ash and refuse, expressed as a percentage of the weight of fuel fired, was 13.15% for the furnace alone and 13.06% when using the attachment. This test, of course, did not bear out the claim frequently made that "fuel-savers" reduced the amount of ash. Following a test in the laboratory, service tests in the home of the writer were made to determine if any material difference existed between the laboratory test and a test under working conditions.

The report states that "No saving in fuel of from 10 to 33½% was obtained, there was no great reduction in ash and clinker, neither was there any noticeable improvement in uniformity of temperature or amount of attention required by the fire." Concluding and commenting upon the testimonial letters from "satisfied users" of these devices the report states that "The large gains claimed cannot, however, be attributed to the merits of the device, but rather to better operations of the heaters and especially to better regulation of the drafts."

This Bulletin, No. 34, of the Engineering Experiment Station Series, is published by the Pennsylvania State College, Pa. Price 25c.

HOW TO HEAT THE HOME, by Norman Whitelaw, manager of the Service Department of the American Radiator Company, has appeared in a second edition in which the data covering steam heating and water heating are combined in a single volume. The book is devoted to the smaller classes of installations and is intended obviously for the benefit of those whose knowledge of heating has been gained largely from practical experience. Most of the apparatus and appliances illustrated are those manufactured by the American Radiator Company. The author's method of allowing for rated boiler capacity is to allow 75% additional for "boiler reserve." Under "Fuel," the author gives useful data on bituminous coal, as well as on anthracite coal, and has something to say regarding gas boilers, but there is nothing on oil fuel. Various piping methods, both for steam and water heating, are shown, as well as four typical vapor heating systems, including what the author terms the N.W. vapor system. Under "Estimating" are given several simple rules for figuring heating requirements, such as the "Mills" rule, the "N.W.," the "C.B.T." and "I.T." rules. Examples are given showing how the rules work out in an 11-room home, heated, in one case, with steam and, in the other, with hot water. These are supplemented with estimate forms and specification and contract forms. The author's long experience of over fifty years in the heating field has enabled him to appreciate the problems of the average fitter and house-heating contractor, and the book has been admirably adjusted to meet their needs. 4½ x 7¼ in. Pp. 223. Cost $2.00 net. May be had direct from the author or through the Book Department of THE HEATING AND VENTILATING MAGAZINE.

THE AMERICAN HEATING MERCHANT has made its appearance as a monthly periodical of the American Radiator Company, Buffalo, N. Y. Vol. I, No. 1 is a publication of 36 pages and cover, with a frontispiece, in colors, of the American Radiator Company Building, in New York. In a foreword the purpose of the publication is set forth as being to develop a steadily increasing business profession. The keynote is struck in the statement that "the members of this profession are not in competition with one another so much as, collectively, they are competing with other industries seeking to obtain a larger share of the public's buying dollar." Among the articles in the initial issue is one on "How Much of the Nation's Business Will Go to the Heating and Plumbing Profession This Year?" Some timely notes on chimneys are included, together with details of the company's direct-mail campaign, with reproductions of the four-color booklets, telling the Ideal story, which the company furnishes in quantities to the contractors to mail to their customers. A photograph of the company's sales convention makes an impressive showing. Departmental features include a page of cartoons, a cash prize contest for selling ideas and a cut-out page for the kiddies.

Swedish Castles to be Steam Heated

Steam heat and running water are to be installed in the old royal castles of Sweden. In a special budget just submitted to the Riksdag the government asks for the necessary funds. Among other items is an appropriation of $16,000 for a heating plant for the thirteenth century Halmstad castle, on the west coast of Sweden.

As we go to press, plans are announced for holding the Second National Heating and Ventilating Show in New York, March 14-27, 1927, at the Twelfth Regiment Armory, Columbus Avenue, 61st and 62nd Sts.

First National Heating and Ventilating Exposition Shows Its Possibilities

IF any doubt existed in the minds of the heating and ventilating industry as to whether the industry is big enough to maintain its own show, this doubt was dispelled by the success achieved by the First National Heating and Ventilating Exposition, which was held in the new Madison Square Garden, New York, March 17-23. It was not a large show, as shows go. But what there was of it was snappy and interesting. The crowds in attendance were satisfactory and at times even large. More impressive than anything else were the comments of the exhibitors themselves expressing their satisfaction with the initial effort and their readiness to back the show another year.

One of the most significant developments was the attitude of those who had given the exhibition idea faint support, or had openly opposed it. They were won over to a man by what they saw. The situation was well expressed by President William H. Driscoll of the American Society of Heating and Ventilating Engineers:

"I am very well pleased" he said, "with the showing made and am sure the exposition can be made a much greater success another year."

So far from being an anti-climax to the Power Show, Mr. Driscoll's suggestion was that next year the show be held simultaneously with the Power Show and he predicted that it could easily become large enough to justify a separate hall even if carried on at the same time as the Power Exposition.

In addition to the exhibits, addresses were made by a number of men prominent in the industry. The program included talks by Chairman Walter L. Fleisher of the Standardization Committee of the Heating and Piping Contractors National Association, who spoke on "Engineering Standards and Certified Heating," R. A. Wolff, of Wolff and Munier, New York, who spoke on "The Burning of the Cheaper Sizes of Coal in Low-Pressure Boilers," and William F. May, of the Anthracite Coal Economy Service, whose subject was "Fuel Economy." At both afternoon and evening sessions of each day motion pictures were shown on various phases of the heating industry.

List of Exhibitors

EXHIBITOR	EXHIBIT
American Society of Heating and Ventilating Engineers	Society and Guide Publications
Aetna Automatic Oil Burner, Inc	Aetna oil burners
Andes Range & Furnace Corporation	Byn-Type reconditioning super air heaters
Aerofin Corporation	Aerofin blast radiation and unit heaters
Abco Boiler Corporation	Abco boilers
Arcoil Heat Machine Company	Arcoil heat machine (oil)
Building Investment and Maintenance Magazine.	
Cooling Tower Company, Inc., The	Air filtration
Consolidated Gas Company of New York	Gas-fired water heaters, gas-fired steam radiators and boilers; also garage heaters.
Economy Grate and Equipment Company	Economy grates and equipment
Fitzgibbons Boiler Company, Inc	Fitzgibbons-Ontario steel boilers
Gifford Heat Control Systems, Inc	Gifford heat-control systems
Walter B. Gilbert and Company	Pullman window ventilators
Heating & Ventilating Magazine Company	The Heating and Ventilating Magazine. books and data sheets.
Hart and Cooley Company	Radiator enclosures, registers and grills
Hanson and Parker	Eastman low-pressure heating coils
The Houseman Stores, Inc	Electric Furnace Man
Kres-Kno Company	Kres-Kno blue-flame oil-gas burners
W. H. Johnson and Son Co	Acme radiator shields
Midwest Air Filters, Inc	Midwest air filters
Herman Nelson Corporation	Univent heating and ventilating units
New York Steam Corporation	Steam service equipment and Pendleton time control
New York Commercial	
Oil Trade Journal	
Oster Manufacturing Company	Oster pipe machines
Peerless Unit Ventilation Company, Inc.	PeerVent heating and ventilating units also Peerless heating and ventilating industrial units
Pyramid Iron Products Company	Pyramid grates
Rathgeb Grate Company, Inc	Grates, forced drafts and double combustion
Reed Air Filter Company, Inc	Reed air filters and radiator cabinets
Ridge Tool Company	Pipe wrenches and vises
Simplex Oil Burning Corporation	Simplex oil burners
Sanitary and Heating Engineering	
Spray Engineering Company	Spraco air filters, flow meters and air washers
United States Ozone Company	Ozone machines
Unishear Company, Inc., The	Flat stock sheet-metal cutter
Wayne Tank and Pump Company	Wayne oil burner and Wayne water softener
Welding Engineer, The	
Wolff & Munier, Inc	Culm-Burn grate equipment
A. H. Wolff Gas Radiator Company	Ideal gas boilers
Carrier Engineering Corporation	Air conditioning

INFILTRATION

Stationary Wood Sash	25	French Doors	100
Double Hung Wood Sash	50	Outside Doors	200
Double Hung Steel Sash	100	Outside Doors with Storm Doors	100
Casement Windows	100	Outside Doors with	
Fenestra	100	Inner Vestibule Doors	100

Metal Weather Strip Deducts 50%

HEATING AND PIPING CONTRACTO

STANDARD RADIATION EST

SHOWING RADIATION REQUIRED FOR

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3 Col 38" St'm Rad	GLASS		INFILTRATION				OUTSIDE WALLS																
	Win. or Door	Sky Light	Rate per Lin. Ft.				Plain Brick			Brick and Pl.			Brick Fur. L. P.			Br. 4" Tile Pl.			Plain Conc.			Conc.
			25	50	100	200	8"	12"	16"	8"	12"	16"	8"	12"	16"	4"	8"	12"	8"	12"	16"	8"
	1.1	1.3	0.45	0.9	1.8	3.6	.42	.32	.26	.38	.29	.25	.27	.23	.21	.30	.26	.22	60	.48	.41	.50
225	71.5	84.5	29.3	58.5	117	23.4	27.3	20.8	16.9	24.7	18.8	16.2	17.5	14.9	13.6	19.5	16.9	14.3	39.0	31.2	26.6	32.5
1	3.12	2.66	7.66	3.84	1.92	.96	8.25	10.8	13.31	9.11	11.9	13.8	12.8	15.05	16.5	11.5	13.3	15.7	5.77	7.21	8.45	6.92
2	6.24	5.32	15.3	7.68	3.84	1.92	16.5	21.6	26.6	18.2	23.8	27.7	25.7	30.1	33.0	23.0	26.7	31.4	11.5	14.4	16.9	13.8
3	9.36	7.98	22.9	11.5	5.76	2.88	24.7	32.4	39.9	27.3	35.8	41.5	38.5	45.1	49.5	34.5	40.0	47.1	17.3	21.6	25.3	20.7
4	12.4	10.6	30.6	15.3	7.68	3.84	33.0	43.2	53.2	36.4	47.7	55.4	51.4	60.2	66.0	46.0	53.4	62.8	23.0	28.8	33.8	27.6
5	15.6	13.3	38.3	19.2	9.6	4.82	41.2	54.0	66.5	45.5	59.7	69.2	64.2	75.2	82.5	57.5	66.7	78.5	28.8	36.0	42.2	34.6
6	18.7	15.9	45.9	23.0	11.5	5.7	49.5	64.8	79.8	54.6	71.6	83.1	77.1	90.3	99.0	69.0	80.1	94.2	34.6	43.2	50.7	41.5
7	21.8	18.6	53.6	26.8	13.4	6.72	57.7	75.6	93.1	63.7	83.5	96.9	89.9	105	115	80.5	93.4	110	40.3	50.4	59.1	48.4
8	24.9	21.2	61.2	30.7	15.3	7.68	66.0	86.4	106	72.8	95.5	110	102	120	132	92.0	106	126	46.1	57.6	67.6	55.3
9	28.0	23.9	68.9	34.5	17.2	8.64	74.2	97.2	119	81.9	107	124	116	135	148	103	120	141	51.9	64.8	76.0	62.2
10	31.2	26.6	76.6	38.4	19.2	9.60	82.5	108	133	91.7	119	138	128	150	165	115	133	157	57.7	72.1	84.5	69.2
11	34.3	29.2	84.2	42.2	21.1	10.5	90.7	118	146	100	131	152	141	165	181	126	146	173	63.4	79.3	92.9	76.1
12	37.4	31.9	91.9	46.0	23.0	11.5	99.0	129	159	109	143	166	154	180	198	138	160	188	69.2	86.5	101	83.0
13	40.6	34.5	99.5	49.9	24.9	12.4	107	140	173	118	155	180	167	195	214	149	173	204	75.0	93.7	109	89.9
14	43.6	37.2	107	53.7	26.8	13.4	115	151	186	127	167	193	179	210	231	161	186	220	80.7	100	118	96.8
15	46.8	39.9	114	57.6	28.8	14.4	123	162	199	136	179	207	192	225	247	172	200	236	86.5	108	126	103
16	49.9	42.5	122	61.4	30.7	15.3	132	172	212	145	191	221	206	240	264	184	213	251	92.3	115	135	110
17	53.0	45.2	130	65.2	32.6	16.3	140	183	226	154	202	235	218	255	280	195	226	267	98.0	122	143	117
18	56.1	47.8	137	69.1	34.5	17.2	148	194	239	163	214	249	231	270	297	207	240	283	103	129	152	124
19	59.2	50.5	145	72.9	36.4	18.2	156	205	252	173	226	263	244	285	313	218	253	298	109	136	160	131
20	62.4	53.2	153	76.8	38.5	19.2	165	216	266	182	238	277	257	301	330	230	267	314	115	144	169	138
21	65.5	55.8	160	80.6	40.4	20.1	173	227	279	191	250	290	269	316	346	241	280	330	121	151	177	145
22	68.6	58.5	168	84.4	42.3	21.1	181	237	292	200	262	304	282	331	363	253	293	345	126	158	185	152
23	71.7	61.1	176	88.3	44.2	22.0	189	248	305	209	274	318	295	346	379	264	307	361	132	165	194	159
24	74.8	63.8	183	92.1	46.1	23.0	198	259	319	218	286	332	308	361	396	276	320	377	138	173	202	166
25	78.0	66.5	191	96.0	48.0	24.0	206	270	332	227	298	346	321	376	412	287	333	393	144	180	211	173

For Methods of Using Table See Back of Sheet.

INFILTRATION

Stationary Wood Sash	25	French Doors	100
Double Hung Wood Sash	50	Outside Doors	200
Double Hung Steel Sash	100	Outside Doors with Storm Doors	100
Casement Windows	100	Outside Doors with	
Fenestra	100	Inner Vestibule Doors	100

Metal Weather Strip Deducts 50%

HEATING AND PIPING CONTRACT

STANDARD RADIATION E

SHOWING RADIATION REQUIRED F

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3 Col 38" St'm Rad	GLASS		INFILTRATION				OUTSIDE WALLS																
	Win. or Door	Sky Light	Rate per Lin. Ft.				Plain Brick			Brick and Pl.			Brick Fur. L. P.			Br. 4" Tile Pl.			Plain Conc.			Co
			25	50	100	200	8"	12"	16"	8"	12"	16"	8"	12"	16"	4"	8"	12"	8"	12"	16"	8"
	1.1	1.3	0.45	0.9	1.8	3.6	.42	.32	.26	.38	.29	.25	.27	.23	.21	.30	.26	.22	60	.48	.41	.5
225	44.0	52.0	18.0	36.0	72.0	1.44	16.8	12.8	10.4	15,2	11.6	10.0	10.8	9.20	8.40	12.0	10.4	8.80	24.0	19.2	16.4	20
1	5.11	4.33	12.5	6.25	3.13	1.56	13.4	17.6	21.6	14.8	19.4	22.5	20.9	24.5	26.8	18.8	21.6	25.6	9.38	11.7	13.7	11.
2	10.2	8.66	25.0	12.5	6.26	3.12	26.8	35.2	43.2	29.6	38.8	45.0	41.8	49.0	53.6	37.6	43.2	51.2	18.8	23.4	27.4	22
3	15.3	13.0	37.5	18.8	6.39	4.68	40.2	52.8	64.8	44.4	58.2	67.5	62.7	73.5	80.4	56.4	64.8	76.8	28.1	35.1	41.1	33
4	20.4	17.3	50.0	25.0	12.5	6.24	53.6	70.4	86.4	59.2	77.6	90.0	83.6	98.0	107	75.2	86.4	102	37.5	46.8	54.8	45.
5	25.6	21.7	62.5	31.3	15.7	7.80	67.0	88.0	108	74.0	97.0	113	105	123	134	94.0	108	128	46.9	58.5	68.5	56
6	30.7	26.0	75.0	37.5	18.8	9.36	80.4	106	130	88.8	116	135	125	147	161	113	130	154	56.3	70.2	82.2	67
7	35.8	30.3	87.5	43.8	21.9	10.9	93.8	123	151	104	136	158	146	172	188	132	151	179	65.7	81.9	95.9	79.
8	40.9	34.6	100	50.0	25.0	12.5	107	141	173	118	155	180	167	196	214	150	173	205	75.0	93.6	110	90.
9	46.0	39.0	113	56.3	28.2	14.0	121	158	194	133	175	203	188	221	241	169	194	230	84.4	105	123	1
10	51.1	43.3	125	62.5	31.3	15.6	134	176	216	148	194	225	209	245	268	188	216	256	93.8	117	137	1
11	56.2	47.6	138	68.8	34.4	17.2	147	194	238	163	213	248	230	270	295	207	238	282	103	129	151	1.
12	61.3	52.0	150	75.0	37.6	18.7	161	211	259	178	233	270	251	294	322	226	259	307	113	140	164	1.
13	66.4	56.3	163	81.3	40.7	20.3	174	229	281	192	252	293	272	319	348	244	281	333	122	152	178	1
14	71.5	60.6	175	87.5	43.8	21.8	188	246	302	207	271	315	293	343	375	263	302	358	131	164	192	1.
15	76.7	65.0	188	93.8	47.0	23.4	201	264	324	222	291	338	314	368	402	282	324	384	141	176	206	1
16	81.8	69.3	200	100	50.0	25.0	214	282	346	237	310	360	334	392	429	301	346	410	150	187	219	1
17	86.9	73.6	213	106	53.2	26.5	228	299	367	252	330	383	355	417	456	320	367	435	159	199	233	1
18	92.0	77.9	225	113	56.3	28.1	241	317	389	266	349	405	376	441	482	338	389	461	169	211	247	2
19	97.1	82.3	238	119	59.5	29.6	255	334	410	281	369	428	397	466	509	357	410	486	178	222	260	2
20	102	86.6	250	125	62.6	31.2	268	352	432	296	388	450	418	490	536	376	432	512	188	234	274	2
21	107	90.9	263	131	65.7	32.8	281	370	454	311	407	473	439	515	563	395	454	538	197	246	288	2
22	112	95.3	275	138	68.9	34.0	295	387	475	326	427	495	460	539	590	414	475	563	206	257	301	2
23	118	99.6	288	144	72.0	35.9	308	405	497	340	446	518	481	564	616	432	497	589	216	269	315	2
24	123	104	300	150	75.0	37.4	322	422	518	355	466	540	502	588	643	451	518	614	225	281	329	2
25	128	108	313	156	78.3	39 0	335	440	540	370	485	563	523	613	670	470	540	640	235	293	343	2

CTORS NATIONAL ASSOCIATION
N ESTIMATING TABLE
D FOR QUANTITIES INDICATED

tructions than that Shown See Heating and Piping Contractors National Association Engineering Standards.

CHICAGO
(Also Milwaukee, Wis.)

TEMPERATURE FACTORS		EXPOSURE FACTORS			
Room Temperature	70°=T_1	N	1.20	S	1.10
Base Temperature	+5°=T_2	NE	1.00	SW	1.25
Base Temp. +5° Equivalent to		E	1.00	W	1.25
Guarantee Temp. of —10° Outside		SE	1.00	NW	1.25

	Conc. Fur L. P.			Frame Std.	Frame No Sh'g	Frame No L. P.	ROOF T&G on 1" Bd.	T&G on 4" Conc.	Sh'gle on Sh'g	Sh'gle Sh'g L. P.	Base Floor Conc. on Earth	Wood on Sleep.	Interm'e Floor 4" Conc.	4" Conc. 3" Fill 1" Fin.	Double Wood	Ceiling Lath and Plas.	L & P Wo. Fl. Over	Partition Stud L & P 1 Side	Stud L & P 2 Side		Type
	8"	12"	16"																		Kind
	.50	.40	.34	.24	.31	.35	.30	.60	.40	.30	.31	.13	.20	.15	.20	.49	.28	.60	.33		Thick.
	32.5	26.0	22.1	15.6	20.1	22.7	19.5	39.0	26.0	19.5	10.8	4.23	6.5	4.87	6.5	15.9	9.1	19.5	10.7		K
	6.92	8.65	10.2	14.4	11.1	9.89	11.5	5.77	8.65	11.5	20.8	53.0	34.6	46.2	34.6	14.1	24.6	11.5	21.0		K(T1-T2)
	13.8	17.3	20.4	28.8	22.3	19.7	23.0	11.5	17.3	23.0	41.6	106	69.2	92.4	69.2	28.2	49.4	23.0	42.0		1
	20.7	25.9	30.6	43.2	33.4	29.6	34.5	17.3	25.9	34.5	62.4	159	103	139	103	42.2	74.0	34.6	63.0		2
	27.6	34.6	40.8	57.6	44.6	39.5	46.0	23.0	34.6	46.0	83.2	212	138	185	138	56.4	106	46.0	84.0		3
	34.6	43.2	51.1	72.0	55.8	49.4	57.5	28.8	43.2	57.5	104	264	173	231	173	70.4	123	57.6	105		4
	41.5	51.9	61.3	86.4	66.9	59.3	69.0	34.6	51.9	69.0	125	318	207	277	207	84.6	148	69.2	125		5
	48.4	60.5	71.5	100	78.1	69.2	80.5	40.3	60.5	80.5	145	370	242	323	242	98.6	172	80.6	146		6
	55.3	69.2	81.7	115	89.2	79.1	92.0	46.1	69.2	92.0	166	424	276	369	276	112	197	92.2	167		7
	62.2	77.8	91.9	129	100	89.0	103	51.9	77.8	103	187	476	311	416	311	126	222	103	188		8
	69.2	86.5	102	144	111	98.9	115	57.7	86.5	115	208	530	346	462	346	141	246	115	208		9
	76.1	95.1	112	158	122	108	126	63.4	95.1	126	229	582	380	508	380	155	270	126	230		10
	83.0	103	122	172	133	118	138	69.2	103	138	250	636	414	554	414	169	294	138	250		11
	89.9	112	132	187	145	128	149	75.0	112	149	270	688	449	600	449	183	320	150	272		12
	96.8	121	143	201	156	138	161	80.7	121	161	291	742	484	646	484	197	344	161	292		13
	103	129	153	216	167	148	172	86.5	129	172	312	794	518	683	518	210	370	173	314		14
	110	138	163	230	178	158	184	92.3	138	184	333	848	553	739	553	224	394	184	334		15
	117	147	173	244	189	168	195	98.0	147	195	354	900	588	785	588	238	419	196	356		16
	124	155	183	259	200	178	207	103	155	207	375	954	622	832	622	252	444	206	375		17
	131	164	194	273	212	187	218	109	164	218	395	1006	657	878	657	266	468	218	396		18
	138	173	204	288	223	197	230	115	173	230	416	1060	692	924	692	282	494	230	418		19
	145	181	214	302	234	207	241	121	181	241	437	1112	726	970	726	296	518	242	440		20
	152	190	224	316	245	217	253	126	190	253	458	1166	760	1014	760	310	542	252	460		21
	159	198	235	331	256	227	264	132	198	264	478	1218	795	1060	795	324	568	264	482		22
	166	207	245	345	267	237	276	136	207	276	499	1272	830	1108	830	538	592	276	502		23
	173	216	255	360	279	247	287	144	216	287	520	1324	864	1155	864	552	616	288	524		24
																					25

← These Items Figured on Basis of K $\left(\frac{T_1-T_2}{2}\right)$ →

CTORS NATIONAL ASSOCIATION
ON ESTIMATING TABLE
ED FOR QUANTITIES INDICATED

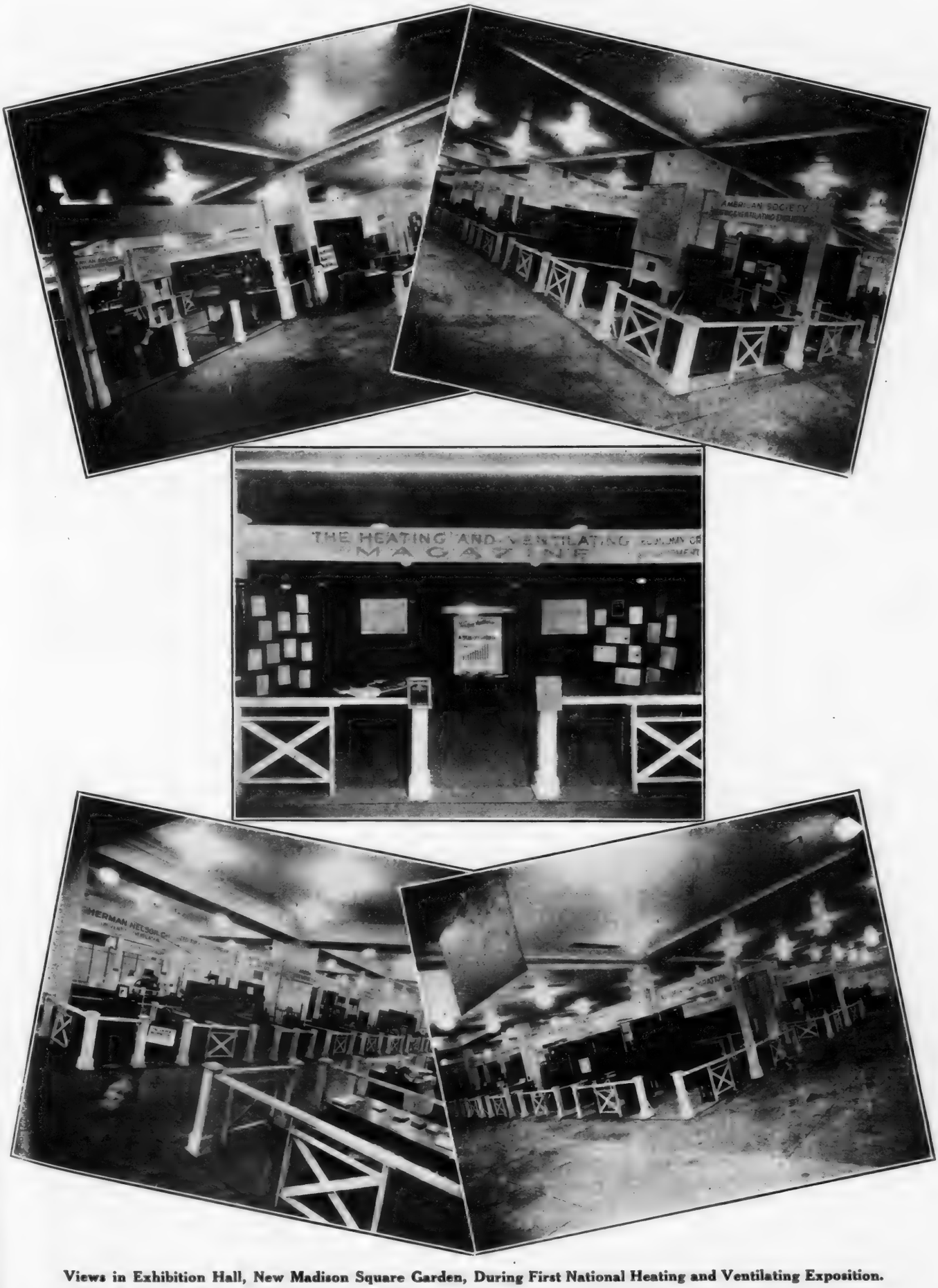
nstruction than that Shown See Heating and Piping Contractors National Association Engineering Standards.

BIRMINGHAM

TEMPERATURE FACTORS		EXPOSURE FACTORS			
Room Temperature	70°=T_1	N	1.15	S	1.00
Base Temperature	+30°=T_2	NE	1.15	SW	1.05
Base Temp. +30° Equivalent to		E	1.00	W	1.15
Guarantee Temp. of +15° Outside		SE	1.00	NW	1.15

	Conc. Fur L. P.			Frame Std.	Frame No Sh'g	Frame No L. P.	ROOF T&G on 1" Bd.	T&G on 4" Conc.	Sh'gle on Sh'g	Sh'gle Sh'g L. P.	Base Floor Conc. on Earth	Wood on Sleep.	Interm'e Floor 4" Conc.	4" Conc. 3" Fill 1" Fin.	Double Wood	Ceiling Lath and Plas.	L & P Wo. Fl. Over	Partition Stud L & P 1 Side	Stud L & P 2 Side		Type
5"	8"	12"	16"																		Kind
41	.50	.40	.34	.24	.31	.35	.30	.60	.40	.30	.31	.13	.20	.15	.20	.49	.28	.60	.33		Thick.
6.4	20.0	16.0	13.6	9.60	12.4	14.0	12.0	24.0	16.0	12.0	6.20	2.60	4.00	3.00	4.00	9.80	5.60	12.0	6.60		K
.7	11.3	14.1	16.6	23.4	18.2	16.1	18.8	9.38	14.1	18.8	36.3	86.5	56.3	75.0	56.3	23.0	40.2	18.8	34.1		K(T1-T2)
.4	22.6	28.2	33.2	46.8	36.4	32.2	37.6	18.8	28.2	37.6	72.6	173	113	150	113	46.0	80.4	37.6	68.2		1
.1	33.9	42.3	49.8	70.2	54.6	48.3	56.4	28.1	42.3	56.4	109	260	169	225	169	69.0	121	56.4	102		2
.8	45.2	56.4	66.4	93.6	72.8	64.4	75.2	37.5	56.4	75.2	145	346	225	300	225	92.0	161	75.2	136		3
.5	56.5	70.5	83.0	117	91.0	80.5	94.0	46.9	70.5	94.0	182	433	282	375	282	115	201	94.0	171		4
.2	67.8	84.6	99.6	140	109	96.6	113	56.3	84.6	113	218	519	338	450	338	138	241	113	205		5
.9	79.1	98.7	116	164	127	113	132	65.7	98.7	132	254	606	394	525	394	161	281	132	239		6
10	90.4	113	133	187	146	129	150	75.0	113	150	290	692	450	600	450	184	322	150	273		7
23	102	127	149	211	164	145	169	84.4	127	169	327	779	507	675	507	207	362	169	307		8
37	113	141	166	234	182	161	188	93.8	141	188	363	865	563	750	563	230	402	188	341		9
51	124	155	183	257	200	177	207	103	155	207	399	952	619	825	619	253	442	207	375		10
64	136	169	199	281	218	193	226	113	169	226	436	1038	676	900	676	276	482	226	409		11
78	147	183	216	304	237	209	244	122	183	244	472	1125	732	975	732	299	523	244	443		12
92	158	197	232	328	255	225	263	131	197	263	508	1211	788	1050	788	322	563	263	477		13
206	170	212	249	351	273	242	282	141	212	282	545	1298	845	1125	845	345	603	282	512		14
219	181	226	266	374	291	258	301	150	226	301	581	1384	901	1200	901	368	643	301	546		15
233	192	240	282	398	309	274	320	159	240	320	617	1471	957	1275	957	391	683	320	580		16
247	203	254	299	421	328	290	338	169	254	338	653	1557	1013	1350	1013	414	724	338	614		17
260	215	268	315	445	346	306	357	178	268	357	690	1644	1070	1425	1070	437	764	357	648		18
274	226	282	332	468	364	322	376	188	282	376	726	1730	1126	1500	1126	460	804	376	682		19
288	237	296	349	491	382	338	395	197	296	395	762	1817	1182	1575	1182	483	844	395	716		20
301	249	310	365	515	400	354	414	206	310	414	799	1903	1239	1650	1239	506	884	414	750		21
315	260	324	382	538	419	370	432	216	324	432	835	1990	1295	1725	1295	529	925	433	784		22
329	271	338	398	562	437	386	451	225	338	451	871	2076	1351	1800	1351	552	965	451	818		23
343	283	353	415	585	455	403	470	235	353	470	908	2163	1408	1875	1408	575	1005	470	853		24
																					25

← These Items Figured on Basis of K (T_1-T_2) →



Views in Exhibition Hall, New Madison Square Garden, During First National Heating and Ventilating Exposition.

New Apparatus and Appliances

Mueller Direct-Fired Unit Heater

Unique ideas are embodied in the design of a direct-fired unit heater, intended for use in factories, warehouses, garages and similar buildings, which has been placed on the market by the L. J. Mueller Furnace Co., Milwaukee, Wis. This company, by the way, is one of the pioneer builders of direct-fired unit heaters.

The new apparatus, which is known as the Mueller direct-fired unit heater, is especially notable for its twenty vertical radiating pipes and two large circular radiators through which the hot gases and smoke rising from the firebed must pass after leaving the combustion chamber. This design provides an unusual area of direct heating surface, adding materially to its efficiency.

The company is manufacturing seven sizes of this heater having approximate deliveries ranging from 88,704 to 543,273 B.T.U. per hour and moving from 460 to 6,600 cu. ft. of air per minute.

Forced circulation is secured by means of an automatically-controlled fan, placed in an air intake at the bottom of the unit (rear). It acts to maintain a uniform pressure on the heater at all times while operating, delivering a large volume of air at moderate temperature.

Mueller Direct-Fired Unit Heater

The fan is mounted between two automatic by-pass louvers which close when the fan is in operation, and open automatically when the fan is idle, admitting air into the casing by gravity, when pressure is released in the heater casing.

A reversible cowl, equipped with two warm-air outlets, is mounted in the hood collar. This permits distribution of heated air in any desired direction. Air ducts may be provided, if desired, to carry heat into other rooms more or less distantly situated in relation to the heater.

One of the features of this unit, it is pointed out, is its availability for providing a positive circulating system, when required for peak loads and quick heating periods, and the gravity circulating system with the necessary free area for night operation or when the building is unoccupied. Being of the direct-fired type, it does not require the services of a licensed engineer and, of course, the possibility of freezing is eliminated.

Republic Co_2 Recorder Motor-Driven

A new motor-driven CO_2 recorder is an interesting device recently placed on the market by the Republic Flow Meters Co., 2240 Diversey Parkway, Chicago, Ill., under the name of the New Republic Motor-Driven CO_2 Recorder. It is designed to give a continuous record of the CO_2 content of the flue gases and is intended for installation under almost any condition. The entire mechanism is completely submerged in oil, so as to reduce wear to a minimum and eliminate corrosion.

A unique feature is the use of a small motor in the operation of the instrument instead of water pressure.

When the gases are drawn from the furnace into the instrument they pass through a brass tubing immersed in oil. The gases then go through the pump and more brass tubing before passing to the measuring chamber. In passing through the pump the gas is divided into fine particles and comes into close contact with the metal. This gives it the temperature of the pump and the surrounding oil. It then passes into the measuring chamber, which is immersed in the same oil and measured at a specific temperature. Next it passes through the potash chamber and then into the final measuring chamber. This final measuring chamber is also immersed in the same oil that contains the pump and first measuring chamber.

The oil chamber is directly above and in contact with the potash chamber, therefore, the oil and potash are the same temperature, or nearly so. If there is a difference of temperature in the oil and potash, they will be corrected in the final measuring chamber, as it too is surrounded by the oil. Therefore there can be no error caused by temperature irregularities.

This instrument requires about 2 gal. of ordinary machine lubricating oil, that should be changed every six months or a year.

The potash chamber holds about 3 gal. of potash; requiring 12 lbs. of the dry potash. This will last from four to six months.

Improved Models of Reed Air Filters

A recent improvement in the design of the Reed air filter, manufactured by the Reed Air Filter Co., Inc., Louisville, Ky., includes the addition of a felt gasket for maintaining a positive seal between the filter frame and the cell, also a new automatic latch for fastening the Reed filter cell in the frame. With the new construction, when the cell is inserted in the frame and pushed into place, it is securely and automatically locked in position. Grasping the handle puts the thumb in natural position to lift the latches when removing the cells for cleaning and charging.

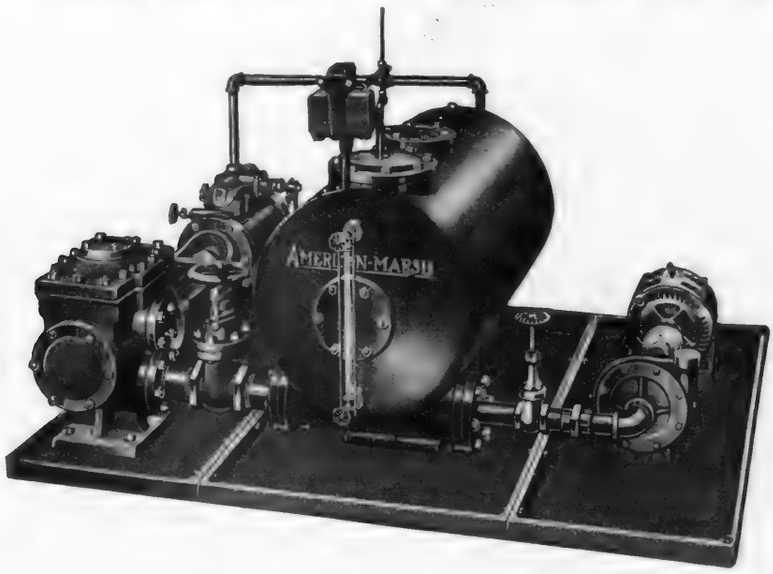
New Model of Reed Air Filter

Features of Combination Steam and Electric-Driven Condensation Pump

The accompanying illustration shows the arrangement of the steam and electric motor driven units which are incorporated in the new Marsh American Marsh condensation pump. This combination permits the pump to function on all pressures from maximum to zero. The importance of this feature is due to the fact that in many heating plants a comparatively high steam pressure is carried during the day, which is sufficient to operate a steam pump, but at night the steam pressure is allowed to drop to approximately zero. Under this condition the condensation is not returned to the boiler, and, in that case.

the receiver tank and the return lines become flooded.

The flexibility feature of the new pump is obtained through a series of



New Condensation Pump with Combination Steam and Electric Drive

controlled switches located in a receiver tank. The automatic control is actuated by two float switches, placed at different levels. The lower float operates the steam pump and the upper float controls the motor-driven pump. When the steam pump ceases to operate the water rises in the tank and throws in the electric pump.

The Protectostat—A New Safety Control for Oil Burners

Operating under the influence of a form of energy that is as inexorable as the force of gravity, a new form of interlocking safety device for intermittently-operated oil burners is announced by the Minneapolis Heat Regulator Co., Minneapolis, Minn.

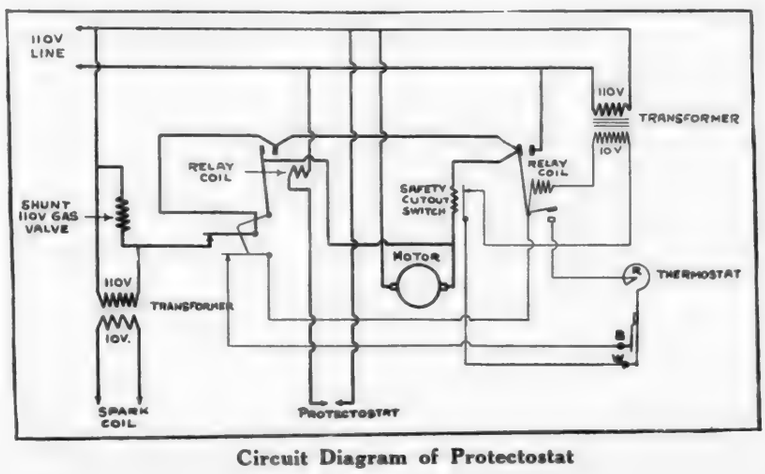
This system involves a conventional room thermostat, a safety cut-out switch, a magnetic gas valve if gas is used, or an ignition relay if there is electric ignition, a Protectostat and a special development of the standard No. 10 relay.

The Protectostat resembles somewhat a Klaxon automobile horn, and is mounted on the burner assembly where possible, but in any event, it is so located that the axis of the tube, constituting its shell, passes through the flame produced by the burner. If the tube were considered as a telescope, it would be necessary for it so "see" the flame. Under this condition, when the flame exists, radiant heat passes up the length of the tube and impinges upon a large metal diaphragm which closes the tube. The diaphragm is very thin, and is fastened at its edges to a heavy brass ring. From the centre of the diaphragm on the side opposite to the flame there extends a flexible metal band, which passes around a pulley, set in the axis of the tube, and terminates in a small helical spring. By means of a threaded rod extending through the tube-wall, with a knurled knob, the tension on the spring may be set as required. Fastened to the shaft carrying the pulley, and turning with the pulley, is a lever-arm with silver terminals on each side of its end. Two contacts, also silver, are set on either side of this arm, so that the movement of the arm, produced by the "buckling" of the diaphragm, causes one circuit to be made and the other broken, or vice versa.

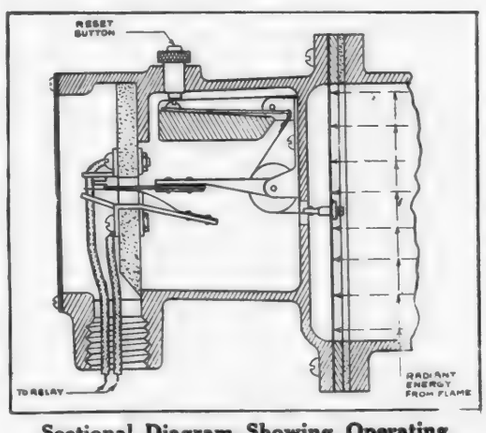
RADIANT HEAT THE OPERATING FORCE

It is thus evident that the mechanism functions through the action of radiant heat, the laws of which are definite and rigid. If a flame with sufficient temperature is started so that it can be "seen" by the diaphragm, the result is practically instantaneous, and certain. The radiant heat striking on the diaphragm is absorbed, and the diaphragm buckles. The extent of buckling and the time required to reach its maximum "bulge" can be determined and regulated.

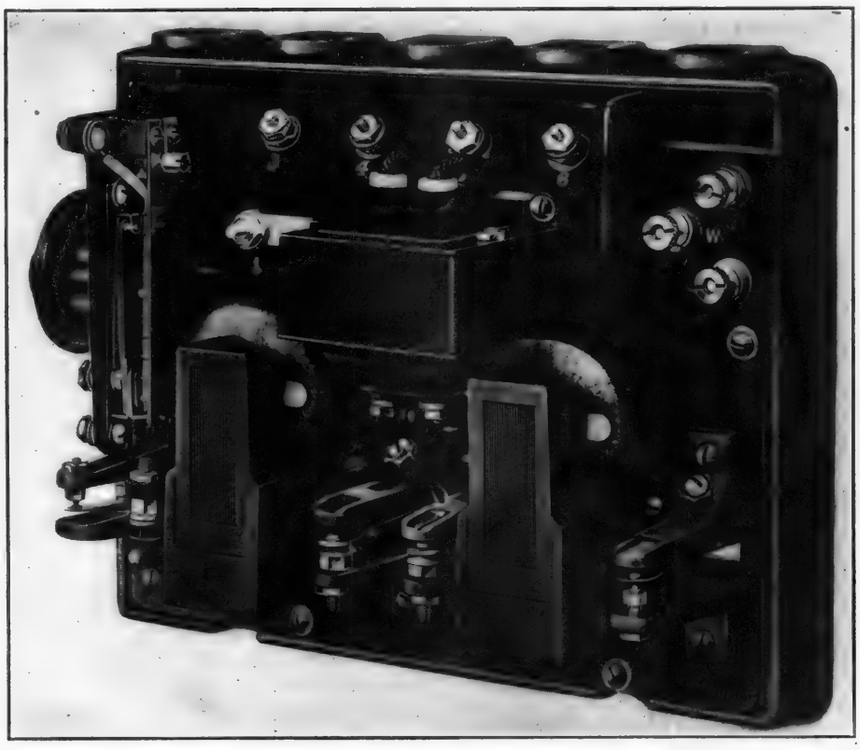
With continued operation the furnace and surroundings rise considerably in temperature. The brass casting composing the flame safety housing also rises in temperature and expands. This does not result, as might at first be thought, in removing the initial buckle set up in the diaphragm by the heat from the flame. The radiant energy from the flame tends to raise the temperature of the diaphragm indefinitely, but it is exposed to the flame and the brass housing and rings are not. The diaphragm, therefore, is always at a higher temperature than the rings and housing when exposed to flame. This difference in temperature, however, causes heat to flow, by conduction, from the diaphragm to the ring and housing and, no matter what temperature the system is, the diaphragm will return to its position of no buckle, and consequent breaking of one contact between 2 and 3, if the flame goes out. On the other hand, as long as the flame remains constant, or increases, this contact between 2 and 3 will be held, even though the temperature of the system rises to a relatively high point, because, while receiving heat in the form of radiant energy, the diaphragm tends always to remain at a higher temperature than the ring and housing.



Circuit Diagram of Protectostat



Sectional Diagram Showing Operating Principle of Protectostat



Minneapolis Series 10 Relay Adapted for Use with Protectostat

From this it is seen that variation of surrounding temperatures has no effect on the adjustment of the flame safety. The diaphragm and its supports having practically the same temperature coefficients of expansion insures that no relative motion takes place between them as long as they are at the same temperature, no matter what the temperature is, within reasonable limits.

HOW THE PROTECTOSTAT INTERLOCKS WITH THE THERMOSTAT CONTROL TO "SAFETY" THE BURNER OPERATION

When the temperature where the thermostat is located drops to the point where heat is required, the control from the secondary of the transformer is closed through the relay coil by means of the blue and white wires, designated by B and W in the diagram. It will be observed, however, that the white wire goes to the safety-switch low voltage contacts and that these must be contacting for operation to take place. Further, it will be observed that the Protectostat contacts 1 and 2 must be together in order that the transformer primaries may be energized. This insures that these contacts must be in normal starting position to obtain operation. Failure of either of these circuits results in no starting, and failure of the white circuit at any time results in no operation.

The New Minneapolis Protectostat

With these circuits properly established, the relay will close and the motor circuit will be energized. As soon as this occurs, the transformer primaries are energized from the motor circuit, independently of the Protectostat contacts 1 and 2, and these contacts may separate and the relay will still stay in.

It will be seen that when the motor starts its current must pass through the resistance wire, which is incorporated in the safety cutout switch. The heat generated by the passage of this current heats the thermostatic blade and if the current continues to pass through the resistance, then, in a predetermined time, the blade will become hot enough to snap out and break the white wire circuit in the switch. When this occurs, the relay drops out by gravity and the burner and all contacts come to the safety stop position.

To start again, the safety switch must be manually re-set. If, however, ignition takes place within the proper length of time, the flame safety comes into operation and closes contacts 2 and 3. This short circuits the resistance of the safety switch and heating stops, permitting normal operation to take place.

If, during operation, the flame goes out for any reason, then, within a few seconds, the flame safety will separate contacts 2 and 3 and the motor current will again pass through the safety switch resistance and in the predetermined length of time, the white wire circuit will be broken and the motor stopped. The burner then requires attention and the safety switch must be re-set manually. In the case of the normal stop, the relay simply drops out due to the breaking of red and white circuit at the thermostat, and starts again when the blue and white circuit is established.

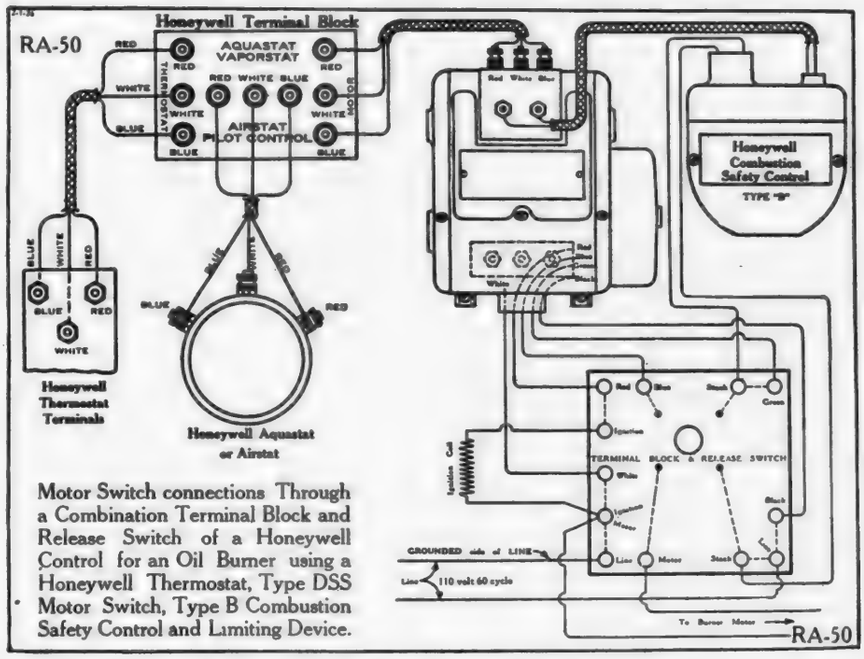
If it is desired to expand gas for a pilot on starting, it may be done by connecting a magnetic gas valve in series with the safety switch resistance. With this arrangement the gas is expanded immediately the motor starts, and returns to normal pilot size directly after the flame safety contacts 2 and 3 close. It will be seen that the gas is kept expanded until ignition has either taken place, or has failed for the pre-determined time, and it is then returned to normal pilot size. Spark ignition may also be provided for, so that practically any set of definitely timed functions may be performed.

The Honeywell Masterstat

A safety device designed to afford protection against firing a dry boiler and provided with a guard against the remote possibility of its own failure, has been brought out by the Honeywell Heating Specialties Co., Wabash, Ind. The new device is known as the Masterstat and is available for installation on steam, vapor or water boilers, fired by oil burning. It is an integral part of the Honeywell system of oil burner control.

A New Master Control for Oil Burners

The necessity for protection against firing a dry boiler has long been felt and field tests of the Masterstat are offered as evidence that the Masterstat will provide that safety. The thermostatic bulb of the Masterstat should be installed so that it rests directly on the



Motor Switch connections Through a Combination Terminal Block and Release Switch of a Honeywell Control for an Oil Burner using a Honeywell Thermostat, Type DSS Motor Switch, Type B Combustion Safety Control and Limiting Device.

Electric Circuit of the Honeywell Masterstat

crown sheet of the boiler. In that way, should the boiler be permitted to go dry or should the burner function on a dry boiler, the crown sheet will quickly transmit the excess heat to the thermostatic element in the bulb. The normal setting on the Masterstat is soon reached and passed and then the device functions as a safety device, breaking the line circuit to the oil burner motor and stopping its operation. Should an emergency occur and the instrument fail through any cause, such failure will inversely break the circuit to the burner motor.

Ordinarily, the Masterstat is a limiting device, performing the function of the Vaporstat or Aquastat. The standard graduations and types of the Masterstat are Type A-1, 150° to 225° F., equivalent to 22 in. of vacuum and 2½ lbs. pressure for water, vapor or vacuum boilers, and Type A-10, from 0 to 10 lbs. pressure for steam boilers.

A New Low-Water Cut-Off and Pressure Switch

A new low-water cut-off and pressure switch, to meet the demand for the control of oil burner motor current as a means of boiler protection, is announced by McDonnell & Miller, Chicago, Ill. The appliance is so constructed that low-water cut-off and pressure cut-off may be easily controlled in the same unit.

The duplex switch is float-operated and is installed in the gauge column with a few simple connections, by removing the gauge glass, re-installing it—after the switch is in place—in the receiver of the switch. It eliminates the use of a separate pressure switch. No stuffing boxes are required since both pressure and low-water cut-off are controlled through a Fulton Sylphon bellows and a mercury tube switch.

The Electric Furnace Man

A new model of the Electric Furnace Man, a device electrically operated, designed to take over the duties of the customary furnace tender, is being marketed by the Houseman Stores, Inc., 532 Courtlandt Ave., Bronx, New York. With this device, it is possible to use the smaller grades of coal in house heaters. The electric attachment to the motor is connected with the house lighting circuit. Coal is fed automatically into the fire box. The ashes are carried out by means of a rotary screw and dropped into a receptacle provided for that purpose. The Electric Furnace Man is listed at $325.00, plus installation charges.

New Resistance Welders

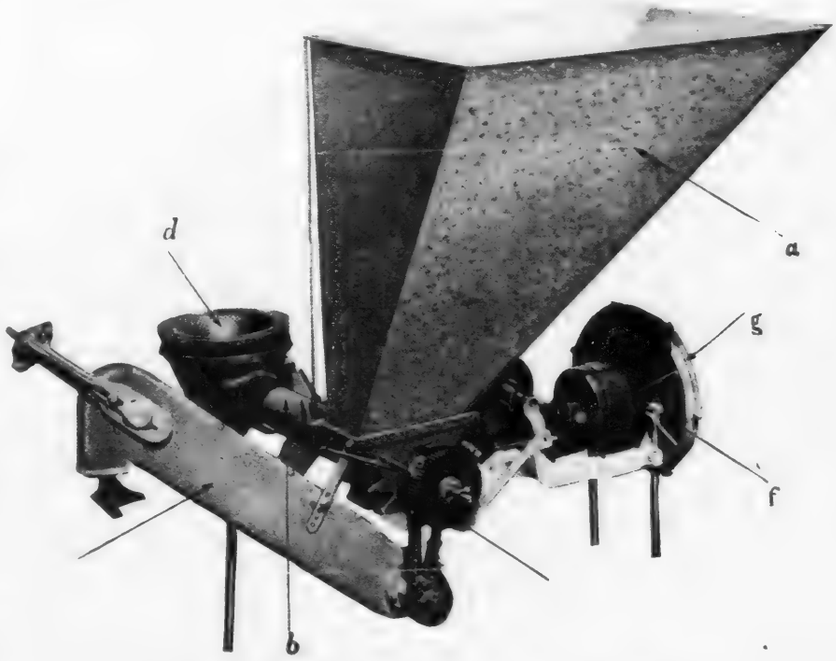
Two automatic resistance welding machines are announced by the General Electric Co., Schenectady, N. Y., one for straight seam work and the other for circular seams.

In resistance welding fusion is effected by heat generated by passing an electric current through the materials to be welded, augmented by pressure, whereas arc welding utilizes an arc or flame to melt the work, electrode, or both.

The two new automatic resistance welders consist of a framework for holding the work, a transformer for supplying the current to the electrodes, movable electrode wheels and the necessary control.

These equipments were designed particularly for welding the seams of light metal containers, such as ice cream cans and drums, and are suitable only for making lap joints with relatively thin material. Among the advantages mentioned are the absence of fumes and open arcs, making the use of masks unnecessary, and the fact that the operator requires no special welding training.

The welding speed obtained with these units varies from approximately 20 in. per minute to 100 in. per minute, depending upon the nature and thickness of the material to be welded. Material up to a total thickness of ¼ in. may be accommodated.



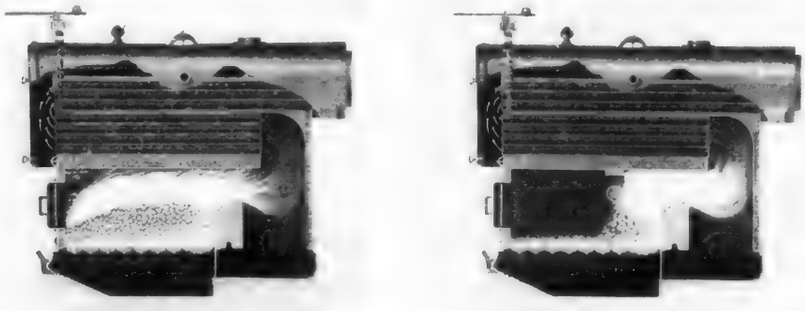
Operating Mechanisms of Electric Furnace Man

Present Accepted Practice in Domestic Oil Burners

As this issue contains so much editorial material dealing with domestic oil burning, it has seemed advisable to omit the serial matter appearing under this heading. The series will be resumed in the May issue.

New Trade Publications

HEGGIE-SIMPLEX ELECTRIC-WELDED STEEL HEATING BOILERS, both of the smokeless and direct-draft types, for steam and water heating, are presented in a new catalog (No. 26) superseding previous issues, published by the Heggie-Simplex Boiler Company, Joliet, Ill. An interesting view of the assembly of a bare boiler is included to show that only seven steel plates are used in its construction. Special attention is drawn to the fact that these boilers are entirely arc-welded, that their ratings are guaranteed, and to the ease with which they may be installed. Full specifications are given for both types. The smokeless type is furnished for capacities ranging from 2,000 sq. ft. to 34,000 sq. ft. of direct steam radiation and from 3,300 to 56,100 sq. ft. of water radiation. The direct-draft type is furnished in capacities ranging from 600 to 34,000 sq. ft. of direct steam radiation and from 1,000 to 56,100 of water radiation. A special section is devoted to the adaptability of the Heggie-Simplex boiler for operation with an oil burner and full data are included for this setting. Size 8½ x 10¾ in. Pp. 24.



Direct-Draft Type Smokeless Type

CONSTRUCTION FEATURES OF HEGGIE-SIMPLEX BOILERS

WHITLOCK HEAT TRANSFER PRODUCTS, including Whitlock Type K storage heaters, Whitlock preheaters for laundries and industrial plants to recover heat from waste process water, and Whitlock American-standard feed-water heaters, copper coil pattern, are new additions to the catalog of the Whitlock Coil Pipe Company, Hartford, Conn., which is being issued in sections, in accordance with the practice advocated by the American Institute of Architects. In addition to construction details and a typical specification for the Type K storage heater, the catalog contains a useful table of hot water fixture capacities for various types of buildings. Size 8½ x 11 in. Pp. 12. (Punched for binding, with extension cover.)

TRANE SMALL CENTRIFUGAL PUMPS is the title of Booklet No. 1 of a series being issued by the Trane Co., La Crosse, Wis. An original idea incorporated in this booklet is a photographic portrayal, at the top of each page, of some detail, illustrating a salient feature of design, construction or adjustment, the rest of the page being devoted to text applying to the picture. Such captions appear as "The easiest pump to clean you ever saw"; "The pump with a shock absorber"; "Packing that stays packed"; "The impeller that laughs at rust"; "The kind of switch the Underwriters like"; "A perfectly rigid foundation," and "The best of motors for the best of pumps." The text matter is in keeping with the photographs, conveying much information with few words. Size 3¾ x 8 in. Pp. 16.

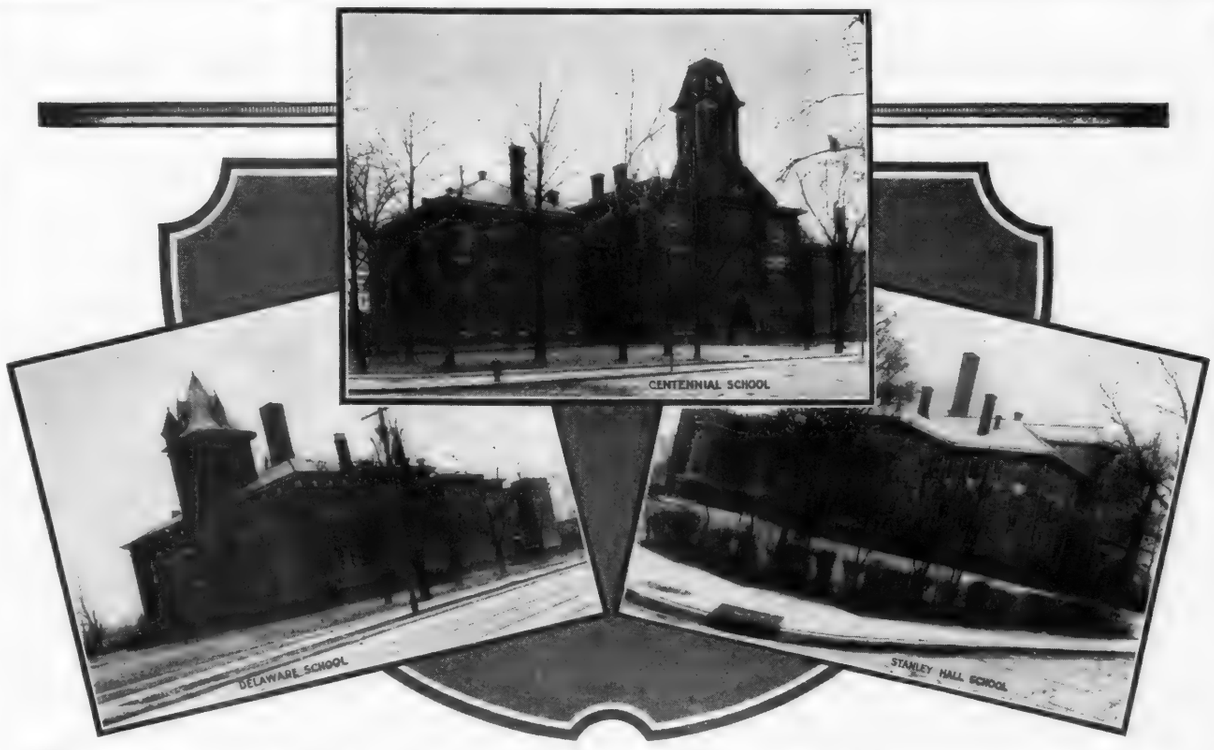
Fulton Expands Its Plant

Three new buildings, which recently have been added to the plant of the Fulton Mfg. Co., Knoxville, Tenn., are impressive evidence of the expansion and growth of this company's business. Only a few months ago, the factory became overcrowded and more room was needed for the corrugating and annealing departments. The building at the left of the accompanying illustration was built and the department moved. Before the building had been completed, the need of additional quarters was realized and the building under way in the central foreground was started to supply this need.

The new structure will contain a single large factory room on the second floor, where will be located the overflow from the corrugating room. The basement may be used for storage or for some of the factory operations.

The building on the right has a single floor in which are departments of carpentry, plumbing, electricity and storage. The three buildings are all of concrete and steel mill construction, with an abundance of windows on all sides. Floors and walls are entirely fire-proof and the roofs are covered with a fire-proof asphalt paper sheet, laid on a base of lumber.

New Additions to Plant of Fulton Company



We get reports like this after 28 and 30 years of Continuous Service

The Heating & Ventilating Engineer who recommends temperature regulation for his clients on a basis of results and not on the first cost alone, will find his specification of the Powers System of Temperature Control supported, time after time, by such evidence as that given in the accompanying letter from the Superintendent of Buildings of the Evansville (Ind.) Public Schools.

In the Centennial School the installation was made 28 years ago; in the Stanley Hall School 28 years ago; and in the Delaware School 30 years ago. And the Superintendent of Buildings, Mr. Charles T. Bush, says: "The cost of upkeep has been so light that I don't think it worth mentioning."

Which is one more experience to prove that the Powers System may be counted on to give long years of uninterrupted service without frequent "service" bills for adjustments and repairs.

The secret lies in the Powers Vapor Disc Thermostat, which is as ready for service in the fall as it was when the fires went out in the spring. No adjustments are needed—no repairs called for.

Our Book "The Elimination of Heat Waste," shows how and why the higher first cost of a Powers System is justified in the end. Sent free to any engineer or draftsman upon request.

Public Schools
Office of the Business Manager
Evansville, Indiana

January 22, 1926.

Powers Regulator Co.,
Chicago, Ill.

Gentlemen:

Answering your letter inquiring about the Powers Service in three of our old schools, will answer:

The temperature control in the Centennial School, Stanley Hall School, also the Delaware School, has been giving perfect satisfaction. The cost of upkeep has been so light that I don't think it worth mentioning. If I have the say about temperature control, I would have no other.

Very truly yours,
Chas. T. Bush,
Supt. of Bldgs.
Evansville Public Schools.

THE POWERS REGULATOR COMPANY

35 years of specialization in temperature control

2718 Greenview Ave., Chicago

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Baltimore	Cincinnati	El Paso	Milwaukee	Philadelphia	CANADIAN OFFICES	
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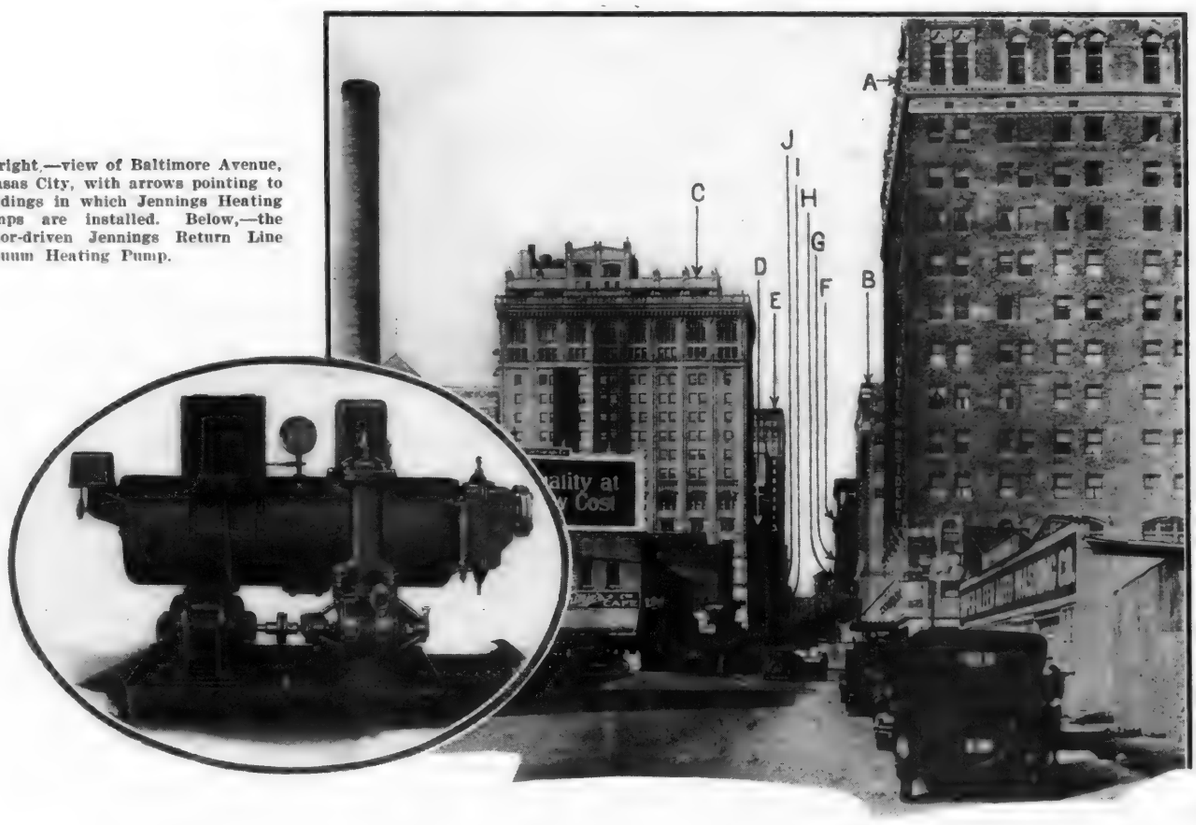
Buffalo	Denver	Indianapolis	Nashville	Rochester	Montreal	Calgary
Butte, Mont.	Des Moines	Kansas City	New Orleans	St. Louis	Halifax	Vancouver

(3398)

At right,—view of Baltimore Avenue, Kansas City, with arrows pointing to buildings in which Jennings Heating Pumps are installed. Below,—the motor-driven Jennings Return Line Vacuum Heating Pump.



"Jennings" Avenue, *Kansas City*

BALTIMORE Avenue, Kansas City, may truly be thought of as "Jennings" Avenue. For, from a point at which the photograph above was taken, there are to be seen a number of prominent hotel, club, and other buildings, in all of which Jennings Heating Pumps are used. These are:

A—HOTEL PRESIDENT—One Vacuum Heating Pump, Duplex Type, and two Centrifugal House Service Pumps.
B—KEITH FURNITURE CO.—Duplex Vacuum Heating Pump.
C—KANSAS CITY CLUB—Duplex Vacuum Heating Pump.
D—ORPHEUM THEATRE—Vacuum Heating Pump.
E—KANSAS CITY ATHLETIC CLUB—Duplex Vacuum Heating Pump.
F—GEO. B. PECK DRY GOODS CO.—Air Line Heating Pump.
G—FINANCE BUILDING—Air Line Heating Pump.
H—KANSAS CITY SCHOOL OF LAW—Condensation Pump.
I—LOWE-CAMPBELL BLDG.—Vacuum Heating Pump.
J—SHANNON BUILDING—Vacuum Heating Pump.

As in Kansas City, so everywhere, Jennings Heating Pumps are invariably found in buildings where good heating is a first requirement.

NASH ENGINEERING COMPANY
SOUTH NORWALK CONNECTICUT

Jennings Pumps

RETURN LINE AND AIR LINE VACUUM PUMPS CONDENSATION AND CIRCULATING PUMPS

BRANCH OFFICES

UNITED STATES

Atlanta, Boston, Buffalo, Chicago, Cleveland, Dallas, Denver, Detroit, Houston, Indianapolis, Kansas City, Los Angeles, Minneapolis, New Orleans, New York, Philadelphia, Pittsburgh, Portland, Richmond, St. Louis, Salt Lake City, San Francisco, Seattle, Washington.

OFFICES IN CANADA

Montreal, Toronto and Vancouver.

EUROPEAN OFFICES

London, England, Norman Engineering Co. Brussels, Belgium, and Amsterdam, Holland, Louis Reijners & Co., Oslo, Norway and Stockholm, Sweden, Lorentzen & Wettre.

Trade and Miscellaneous Notes

Coming Events

April 6-8, 1926.—Third annual convention and exposition of the American Oil Burner Association, in Detroit, Mich. Headquarters at the Book-Cadillac Hotel.

April 14-15, 1926.—Annual convention of the National Warm-Air Heating and Ventilating Association, in St. Louis, Mo. Headquarters at the Clare Hotel.

May 26-28, 1926.—Semi-annual meeting of American Society of Heating and Ventilating Engineers, in Lexington, Ky. .

June 1-3, 1926.—Seventeenth annual convention of the National District Heating Association, at Niagara Falls, N. Y. Headquarters at the Niagara Hotel.

June 1-4, 1926.—Thirty-seventh annual convention of the Heating and Piping Contractors National Association, at Washington, D. C. Headquarters at the Willard Hotel.

June 22-24, 1926.—Forty-fourth annual convention of the National Association of Masters Plumbers, at Louisville, Ky. Headquarters at the Brown Hotel.

Miscellaneous Notes

Chicago Oil Burner Dealers' Association and Sales Organization held its first banquet in the West Room of the Hotel Sherman, Chicago, February 16. Chairman E. P. Fahey acted as toastmaster. Among the speakers were Charles Henry MacIntosh, B. A. Breed of the Underwriters' Laboratories, Arthur Myhrun of the *Chicago Tribune* and Carl E. Whitney. Music was furnished by the Federal Gauge Company.

Carnegie Institute of Technology, Pittsburgh, Pa., is calling special attention to its courses in plumbing and welding which will be given during the summer session. According to the plans the College of Industries will give six-week courses from June 28 to August 6, in plumbing and oxy-acetylene, under the direction of the Department of Plumbing, Heating and Ventilating.

Building Operations for February, 1926, reached a high total in spite of a decided drop from January. Building and engineering contracts let last month in the 37 States east of the Rocky Mountains, according to the F. W. Dodge Corporation, amounted to $389,899,800. The drop from January was 15%, but there was an increase of 25% over February of last year, making last month's figures the highest February total on record. Extreme winter weather conditions are given as one of the causes for the drop from January.

Included in last month's record were: $178,747,800, or 46%, of all construction, for residential buildings; $66,710,800, or 17%, for public works and utilities; $50,176,700, or 13%, for commercial buildings; $40,422,000, or 10%, for industrial buildings; and $20,721,500, or 5%, for educational buildings.

Building and engineering work started during the past two months has amounted to $847,058,400, being an increase of 37% over the amount started in the first two months of last year. February construction contracts in New York State and northern New Jersey amounted to $104,859,500. Although this was a decrease of 46% from the very high January figure, it was at the same time a 65% increase over February of last year. In New England the construction figures came to $19,668,500. Decrease from January was 23% and from February of last year 19%. In the middle Atlantic

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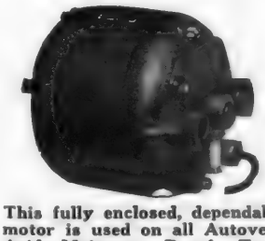
Here is Autovent's answer to the demand for an Acid-Moisture Proof Fan. A well built, durable unit.



This fully enclosed, dependable motor is used on all Autovent Acid-Moisture Proof Fans. Note its careful, fully enclosed construction.

Autovent Acid-Moisture Proof Fans are built for strenuous duty under severe conditions.

THESE fans are not the ordinary kind. An extra large and powerful motor is provided. The motor is completely enclosed, providing protection against moisture and acid fumes, dirt, grease and other foreign matter. Inspection covers are protected with gaskets and tight fitting joints. Lead-in wires have rubber bushings.

Autovent Acid-Moisture Proof Fans are reliable. They will perform under conditions where an ordinary fan would be out of the question. All fan parts are given two full coats of special acid-moisture paint.

When you install Autovent, you are building satisfaction and good-will.

A copy of our large 10th Edition Catalog is ready for you. If you do not have one, write at once. We'll send it by return mail.

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States, the construction contracts amounted to $27,193,200. This is a drop of 22% from the preceding month, and 10% from the preceding February. In the Pittsburgh district the figures ran up to $46,189,800. There was a 19% increase over January, but a 3% decrease from February, 1925. The southeastern States reported figures of $85,253,500. This represents an increase over January of 30% and over February of last year 83%. In the central west, the figures were $85,268,900, an increase over January of 8% and over February of last year of 8%. In the northwest, the February construction contracts amounted to $5,289,900, an increase over January of 32% and over February of last year 15%. In Texas the figures reported are $16,176,500, a decrease of 15% from January and an increase of 25% over the preceding February.

American Gas Association has inaugurated a competition for plans for a six-room house with a view of demonstrating to the public how adequate and economical provisions may be made for gas service. $25,000 will be distributed among nine prize winners. The competition will make it possible for every home owner or prospective home owner to secure plans that will provide for the most modern and efficient gas appliance and piping. Terms of the contest are available from the architectural advisor, William Adams Delano, American Gas Association, 342 Madison Avenue, New York.

Eastern Supply Association, at its meeting in New York, February 10-11, took a decided stand in favor of the principle of "making an order an order." The proposition received the unanimous endorsement of the meeting. On the question of a national credit bureau for manufacturers of heating and plumbing goods, it was voted to appoint a committee of ten to study the matter and report at the next meeting. A novel feature of the meeting was separate sessions of jobbers and manufacturers. Five hundred members and guests were in attendance. Among the speakers were President Howard Coonley, of the Walworth Company; William J. Woolley, vice-president of the Wolff Mfg. Company, and William G. Bergner, manager of the National Trade Extension Bureau. In the review of business conditions R. D. Flershem, vice-president of the American Radiator Company, told of the record business anticipated in 1926 and reminded his hearers of the fact that there are 24,000,000 homes in America, only 7,000,000 of which have heating equipment, while 1,000,000 homes are built each year.

Washington Oil Burner Distributors' Association held its first annual banquet in Washington recently at the Mayflower Hotel. The speakers included Chief Engineer George S. Watson of the District of Columbia Fire Department, who spoke on "Efficient Installation of Oil Burners"; and Major Raymond A. Wheeler, assistant engineering commission of the District of Columbia, who spoke on "Co-operation." Other speakers were Captain F. W. Hoover, chief of maintenance and operation of public buildings and grounds, and Robert F. Beresford, a local architect.

Boston, Mass.—Boston's "Home Beautiful and Building Trades Exposition" will go on in May at the Mechanics' Building, Boston. The show, which is under the management of Chester I. Campbell, 329 Park Square, Boston, will include exhibits devoted to heating and ventilating apparatus. Another show, which will immediately follow, known as the New England Hotel Men's Exposition, will give heating a prominent place on its program on account of the experiences hotel men have had with fuel during the past winter.

American Society of Mechanical Engineers will hold a New England meeting in Providence, R. I., May 3-6. The society's Spring meeting is scheduled for San Francisco, June 28-July 1.

Kansas City, Mo.—Evidence that heating and ventilating engineers are on their mettle in connection with the open-window ventilation, agitation has already appeared in the form of newspaper clippings showing how they are combating erroneous views on the subject. In a recent issue of the *Kansas City Star*, for instance, E. K. Campbell, of Kansas City, replies vigorously to a correspondent who declared that "old

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When banks make investments they first consider security.

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are securing the perfect condition of the 110,000 CFM of air ventilating this beautiful building.

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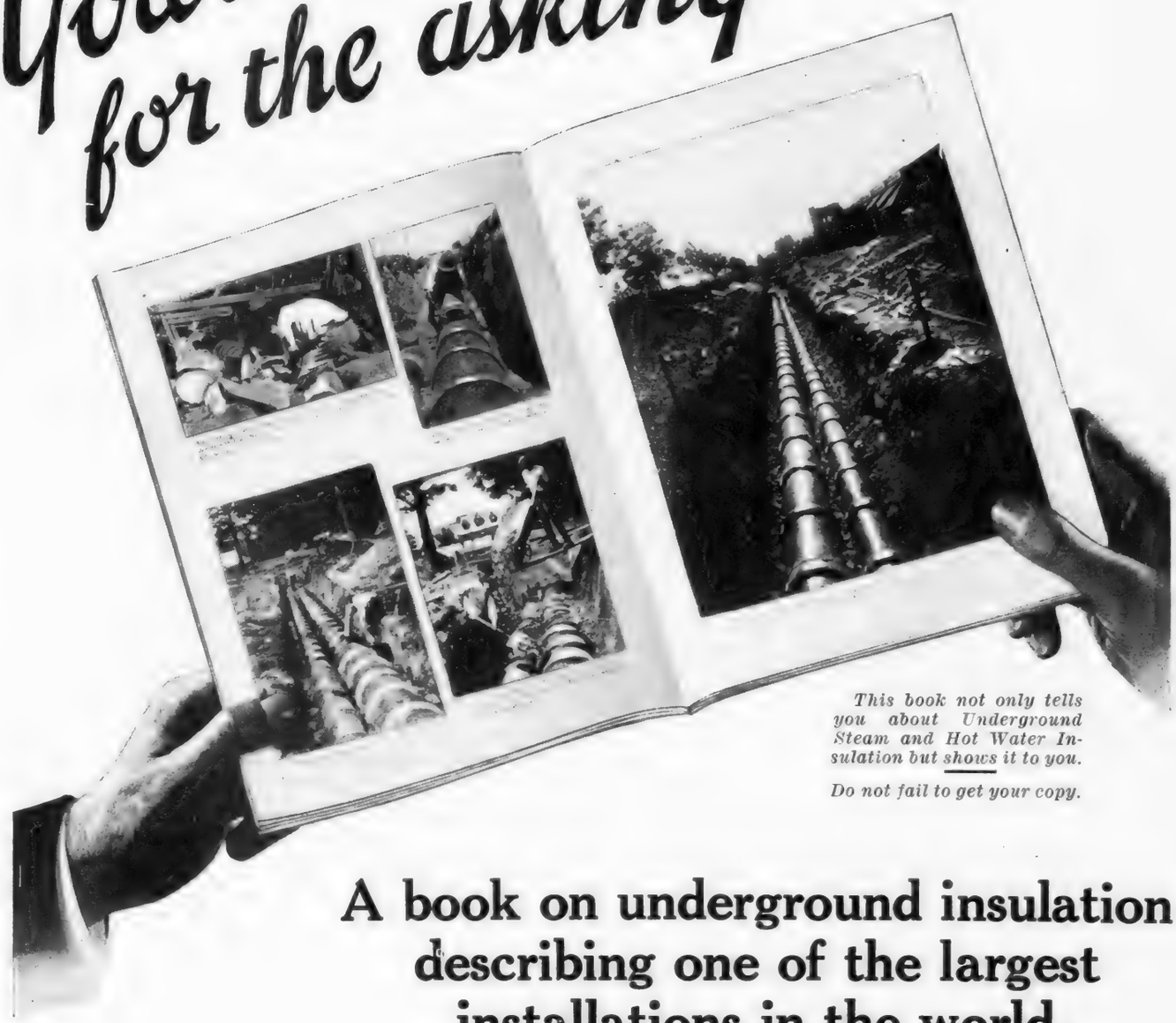

This book not only tells you about Underground Steam and Hot Water Insulation but shows it to you.

Do not fail to get your copy.

A book on underground insulation describing one of the largest installations in the world

EVERY heating engineer should have this book containing complete data on the 19,400 ft. installation of the Johns-Manville Underground Insulation System on the steam and hot water lines of Cornell University.

It includes descriptions, tests, drawing and plans, progress and detail photographs, and other interesting pictures and text. It should be yours for reference. Send for your copy now.

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Underground System of Insulation

ventilation (referring to window ventilation) is best."

St. Louis, Mo.—Failure of heating contractors to bid on work controlled by general contractors has brought about a serious situation in that some important projects, such as the new administration building at the Isolation Hospital, are being held up. At a hearing before the Board of Public Service where a delegation appeared representing the Heating and Piping Contractors St. Louis Association, it was brought out the general contractor on this building was unable to secure any bids for the $20,000 heating sub-contract. The standpoint of each side was vigorously presented. The board deferred action.

Brooklyn, N. Y.—Brooklyn's fourth annual "Own-Your-Home" Exposition will be held at the Twenty-third Regiment Armory, in Brooklyn, April 5-10. The show will feature heating and plumbing exhibits.

New York.—Sales of furnace-oil and distillates for domestic burner consumption, made by Empire Refineries and the Cities Service Company, were 30% higher in 1925 than in 1924, according to Henry L. Doherty & Co., which controls these two sources of supplies. Other reports indicate that the sales of light fuel-oil in New York and New England during January were 40% higher than for the corresponding month in 1924. During the same period furnace-oil sales were 100% higher.

Manufacturers' Notes

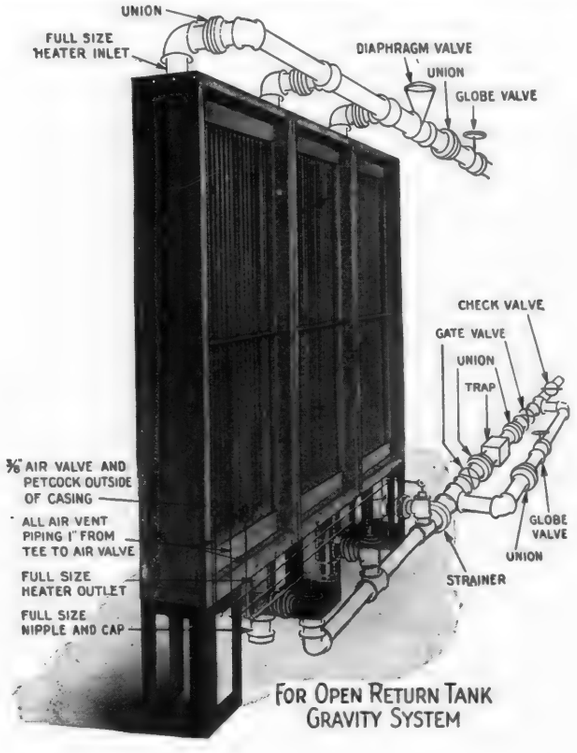
Chicago Pump Co., Chicago, Ill., announces the appointment of Joseph J. Monahan, head of the Monahan Pump Equipment Company, as eastern New England sales agent for the entire line of pumps manufactured by Chicago pumps. This line includes pumps used in both the industrial and building fields, such as general supply, boiler feed, condensation, vacuum, sewage disposal and bilge pumps. Mr. Monahan has been actively associated in the sale of these pumps for the past seven years in New England. The Monahan Pump Equipment Company is located at 200 Devonshire St., Boston.

Heggie-Simplex Co., Chicago, has appointed F. H. McGarry, formerly connected with the Philips-Getschow Company, as one of its Chicago representatives, covering architects and part of the Chicago heating trade.

L. J. Mueller Furnace Co., Milwaukee, Wis., held its annual sales conference in Milwaukee, February 8-12, when merchandising plans were discussed and a study made of the manufacturing processes used in the company's line of warm-air furnaces, boilers, registers, pipe and fittings, tank heaters, direct-fired forced air unit heaters and the Mueller Furnacette. The merchandise conference was designed to help the retail dealer in the resale of his heaters and the analysis of his market. In this way the company's salesman will be better equipped to serve the retail dealer in an increasingly difficult task of retaining his position as a leader in the local retail field, which is justifiably his. Among the speakers were H. P. Mueller, N. M. Blanchard, H. Hotton, Jr., Mr. Miles, J. J. Traill, J. H. Garrison and L. J. Mueller, Jr. The conference concluded with a dinner at the Hotel Astor.

Richardson & Boynton Co., New York, had 125 sales representatives at its sales conference, in New York, January 28-29. One day was spent at the company's plant in Dover, N. J. A feature of this visit was the demonstration of the proper use of soft coal in one of the company's new round smokeless boilers, which was made by H. B. Meller, chief of the Pittsburgh Health Department Smoke Ordinance Bureau. Among the speakers at the New York sessions were President D. Rait Richardson, D. S. Richardson, W. R. Eaton, H. L. Anness and M. F. Gilbert. The conference closed with a dinner at the Hotel Astor.

P. F. MaGirl Foundry and Furnace Works, Bloomington, Ill., was the host at a three-day convention of the National Furnace and Research Association, made up of dealers and distributors of MaGirl products, held at the company's plant in Bloomington. Addresses were given by Professor A. P. Kratz, research professor at the University of Illinois; C. S. Hopkins, of Dallas, Texas; Senator Frank H. Funk and



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Newark, N.J.
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AEROFIN

Fan-System Heating Surface

To Engineers, Architects and Contractors

THREE YEARS OF SUCCESSFUL SERVICE demonstrates that AEROFIN has established itself as a dependable product.

ENGINEERS OF NATIONAL REPUTATION AND TWENTY YEARS' EXPERIENCE WITH FAN SYSTEM HEATERS, are responsible for the design, development, manufacture and marketing of AEROFIN, and their services are at your command to assist you in working out your heating, ventilating, cooling and drying problems.

SINCE THERE IS NO EQUAL TO AEROFIN, WHY NOT SPECIFY IT OUTRIGHT? Plans and specifications should show sizes and number of units, with piping details.

AEROFIN HAS A TREMENDOUS ADVANTAGE in its LIGHTWEIGHT. AEROFIN weighs only 9% to 25% as much as the old-fashioned heavy heaters. AEROFIN SAVES A GREAT DEAL OF SPACE.

AEROFIN IS MADE OF NON-CORROSIVE METALS. This feature meets with universal approval.

THE INSTALLED COST OF AEROFIN IS GENERALLY LESS than that of cast-iron heaters and pipe coils. AEROFIN (completely encased) can be erected in the same number of HOURS as is required in DAYS to erect the heavy heaters. This means a great saving in erecting cost.

THE INSTALLATION OF AEROFIN WITH VERTICAL TUBES IS RECOMMENDED as this arrangement is less subject to errors of installation and operation. THE HORIZONTAL TUBE ARRANGEMENT is satisfactory when installed in accordance with our instructions and diagrams.

Write for catalog, instruction leaflet and service details.

Aerofin is Sold ONLY by Manufacturers of Nationally Advertised Blower Heating Apparatus.

Standard Equipment on all these Boilers

Abendroth	Coatesville	Heggie-Simplex	Kewanee	Otis-Sawyer-Economy	Ross
Ames	Congress	Imperial	L-O	Pierce-Pebco	Senate
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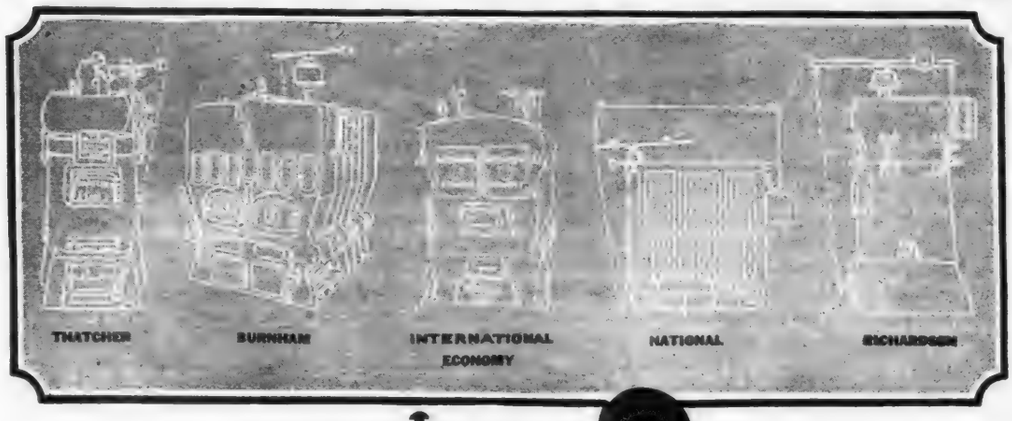
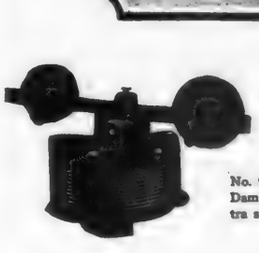
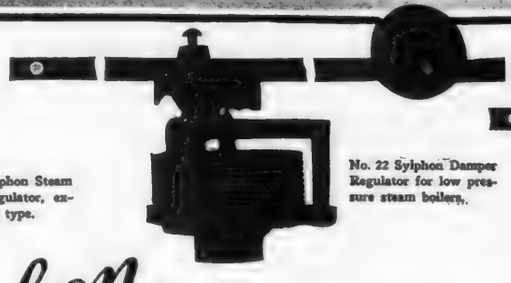
B-Line	Floral City	Keysco	National	Richardson	Star
Burnham	Freed	Keystone	Oil City	Richmond	Thatcher
Coil					West Coast

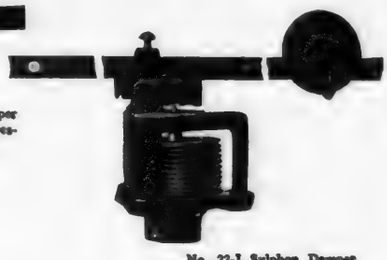




No. 924 Sylphon Steam Damper Regulator, extra sensitive type.



No. 22 Sylphon Damper Regulator for low pressure steam boilers.



No. 22-J Sylphon Damper Regulator for low pressure steam boilers with light dampers.

Sylphon Steam Damper Regulators

DON'T OVERLOOK THEIR VALUE ON ANY HEATING BOILER

The well known Sylphon bellows (used as the diaphragm in Sylphon Regulators) with its everlasting sensitiveness and positive action, opens and closes the draft dampers in *continuous* and *proportionate* response to slight changes in steam pressure. There is no intermittent or snap action, with resulting lag in regulation behind pressure changes.

The results are uniform heating, low fuel consumption, and no needless manual adjustments of drafts.

Sylphon Damper Regulators outlast the boiler itself. They can be installed on any make of boiler, of course.

When you insist on Sylphon Regulators for every boiler you install, you guarantee heating satisfaction for your clients. ***Let us send you Bulletin W DR-5***

Every genuine Sylphon bellows is drawn and formed seamless from a flat sheet of specially prepared metal, with folds or corrugations formed to provide the greatest strength and flexibility.

This can be done hundreds of thousands of times—
AND NO APPRECIABLE LOSS OF FLEXIBILITY WILL DEVELOP IN THE ALL METAL SEAMLESS SYLPHON BELLOWS
Sylphon

Breakdown, so common with the ordinary type of thermostat is eliminated, for neither years of constant use nor the powerful action of steam weaken the Sylphon bellows.

THE FULTON COMPANY KNOXVILLE, TENN.

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Willis H. Harwood. The following new officers of the association were elected: President, E. L. Jaynes, Minneapolis; vice-president, I. F. Grumbein, Philadelphia; secretary, Len F. Sargent, Wausau, Wis.

Foxboro Co., Inc., Foxboro, Mass., announces the removal of its Chicago office to Rooms 204-206 St. Clair Building, 154 East Erie Street. C. H. Roessner continues in charge.

Warren Webster & Co., Camden, N. J., has appointed Leon G. Gauvin as resident engineer for Buffalo and vicinity. Mr. Gauvin was formerly connected with the company's home office and factory in Camden.

Duriron Co., Inc., Dayton, O., announces the appointment of L. W. Gibbons to represent the company's Building Equipment Department in eastern New York State, Connecticut, Vermont and western Massachusetts. Mr. Gibbons will maintain his headquarters at the company's New York office, at the Grand Central Terminal.

Dooley & Braden, Chicago, Ill., manufacturer of the Nu-Way oil burner, has moved into their new plant at 2416 Fourth Avenue, Rock Island, Ill. The new quarters will triple the company's production capacity.

Baker Oil Burner Corporation, New York, held its annual dealers' convention, in New York, February 22. This was followed by a dinner at the National Republican Club. Among the speakers were Secretary Leod D. Becker, of the American Oil Burner Association; P. E. Fansler, associate editor of THE HEATING AND VENTILATING MAGAZINE; John W. Pauling, sales engineer for the Minneapolis Heat Regulator Company; C. A. Orr, vice-president and general manager of the Automatic Home Heating Company and consulting engineer of the Baker Steam Motor & Mfg. Company, of Pueblo, Colo.; and President S. W. Eckman, of the Baker Oil Burner Corporation. Dealers from the eastern territory were present and reported an encouraging outlook for an increased sale of residence burners during the coming season.

Abram Cox Co., Philadelphia, Pa., is the changed name of the Abram Cox Stove Company. This company, which is one of the oldest of its kind in America, was organized in 1847. In addition to manufacturing coal tank heaters, gas water heaters, and coal and gas ranges, the firm has been manufacturing warm-air furnaces for over 50 years. It started manufacturing boilers in 1888. It is estimated that in Philadelphia and suburban districts alone, at least 300,000 homes are equipped with some heating or cooking appliances manufactured by the company.

Richmond Radiator Co., New York, has appointed Sherwood C. Bliss assistant to the president, in charge of manufacture. Mr. Bliss is well known in the heating industry, having been connected in an engineering capacity in the production of boilers and radiators for the past 17 years. During the war Mr. Bliss had charge of the engineering of the 4-in. naval guns made at Bayonne, N. J. In 1924 he was appointed director of mechanical engineering and design for one of the largest radiator companies. He is a member of the Engineering Society of Buffalo and the Society of Industrial Engineers.

Socony Burner Corporation, Brooklyn, N. Y., is planning to move its factory from the Bush Terminal, in Brookyln, to Greenpoint, Long Island, New York. The Socony Corporation is a subsidiary of the Standard Oil Company of New York, and has the manufacturing and distributing rights for the Socony burner for New York and New England. For all the other sections of the United States, these rights are in the hands of the Timken-Detroit Company, of Detroit, Mich. The Socony Arrow burner recently has been approved by the New York City Board of Standards and Appeals.

Johnson Oil Burner Co., Los Angeles, Cal., has moved its main offices, to 1824 South Hope Street, in the same city.

Kieley & Mueller, New York, manufacturers of steam, water and air specialties, have granted the exclusive agency for their products in the State of Missouri, Kansas and the southern half of Illinois to the Reeves & Skinner Machinery Co., 2211 Olive Street, St. Louis, Mo.

TWINFAN Unit Heaters

Get the Facts about Factory Heating

WHEN you estimate a big industrial heating job you know your item for labor cost is probably far from what your actual cost sheet will show.

If you only had the facts about this cost in advance, you could protect yourself and be reasonably sure you wouldn't lose money.

How can you get these facts?

Well, one sure way is to recommend TwinFan Unit Heaters. One TwinFan takes the place of seventeen ordinary radiators and requires no more work to install than a single radiator. With your labor item divided by seventeen it loses all its uncertainty.

You can estimate in comparative safety on a TwinFan job.

May we give you additional facts about this ideal industrial heating system?

DWYER EQUIPMENT COMPANY
4534 W. NORTH AVE. CHICAGO, ILL.

NEW—a radiator bracket with only three points of contact

HERE is a bracket that practically eliminates the difficulty experienced with uneven walls when hanging the legless types of column radiators. The new Grinnell Adjustable Column Radiator Bracket has only three points of contact. And they call for only one bolt to fasten them securely to the wall.

Their range of adjustability is wide, both vertically and horizontally. So wide, in fact, that when Grinnell Column Radiator Brackets are used, the bolts attaching the brackets to the wall can be set without extremely accurate measurements. The speed and ease which they contribute to radiator installation makes their use the soundest sort of an economy.

Write for sheets giving full details. Address Grinnell Company, Inc., 280 West Exchange St., Providence, R. I.

GRINNELL

Fittings, Hangers, Valves, Pipe Bending Welding, Piping Supplies, Etc.

McCann-Harrison Corporation, Cleveland, O., announces that Burt S. Harrison, formerly advisory engineer for Drying Systems, Inc., Chicago, is now associated with the McCann-Harrison Corporation as vice-president in charge of all engineering.

Newport Boiler Co., Chicago, Ill., has moved its general offices from 105 South Dearborn Street to the Bailey Building, 529 South Franklin Street.

Home Appliance Corp., St. Louis, Mo., has appointed R. S. Beale to the office of vice-president in charge of sales and service. Mr. Beale succeeds Wallace C. Capen who has resigned. He was formerly vice-president of the Automatic Oil Burner Corporation, New York, distributor of Electrol and Northern oil burners. Hans A. Kunitz, for a number of years chief engineer of Gilbert and Barker, and later technologist for the American Oil Burner Association, has been appointed vice-president to take charge of experimental work and production. Phillip S. Russell, former vice-president, in charge of production, has resigned. The capitalization of the company is to be increased from $300,000 to $1,000,000. Consolidation proceedings between the Standard Steam Corporation, holders of the patents on the Electrol burner, and the Home Appliance Corporation, manufacturers and distributors, are pending.

Socony Burner Co., New York, manufacturers of Arrow burner is carrying on experimental work in its laboratories in Brooklyn, with a view of burning heavier oils in domestic heating.

Williams Oil-O-Matic Heating Corp., Bloomington, Ill., has let a contract for the construction of a $100,000 main office building in Bloomington, to be completed early in the summer. Among the features of the new building will be training rooms for salesmen, a cafeteria and a convention hall.

Trane Co., La Crosse, Wis., announces the appointment of Allen P. Livar as manager of the company's New Jersey branch, with a metropolitan office at 45 Academy Street, Newark, N. J. Mr. Livar is a graduate of Georgia Tech, class of '18, and holds the degree of B.S. in mechanical engineering. He has been connected with the heating industry since 1920, first with the American Radiator Company, and later with Johns-Manville, Inc., and afterwards with the Pierce, Butler & Pierce Mfg. Corporation.

A. Y. McDonald Mfg. Co., Dubuque, Ia., jobbers of heating and plumbing supplies, has opened a branch office in Kansas City, Mo., at 1406 Union Avenue. The branch will serve Missouri, Kansas, Oklahoma and Arkansas. P. A. Williams is manager and C. E. Dodds, assistant manager.

James Hunter Machine Co., North Adams, Mass., builders of standardized drying equipment and designers of special dryers for the various industries, announces the appointment of Lucien Buck as manager of the Dryer Division. He will also be in charge and will direct the work of the company's Research Drying Laboratory and Dryer Service. Mr. Buck was formerly manager of the Industrial Drying and Lumber Dry Kiln Departments of the B. F. Sturtevant Company, Hyde Park, Boston, Mass., and has long been recognized as a specialist on air systems and an authority on drying operations. He is a frequent contributor to technical journals on drying. He will continue in the same kind of work as manager of the Dryer Division of the James Hunter Machine Company.

New Corporations

Pease Co., Springfield, Mass., capital $30,000, to deal on oil-burning equipment. Incorporators: William W. Morency, president; Walter S. Pease, 35 Westminster St., Springfield, treasurer; and Paul H. Wagner, secretary.

St. Petersburg Plumbing Co., St. Petersburg, Fla., capital $150,000. Incorporators: R. L. Harris and J. W. Percy.

M. J. Ford Co., Bridgeport, Conn., capital $25,000, to conduct a heating and plumbing contracting business. Among the principals are M. J. Ford, 2434 Main Street, Bridgeport.

Gehri Heating & Plumbing Co., Tacoma, Wash., capital $15,000. Incorporators: A. B. and A. L. Gehri.

DE BOTHEZAT
Disc Pressure Fans

Any Size — Pressure — or Volume

HIGH STATIC PRESSURE
HIGH EFFICIENCY

De Bothezat Engineering Corp.
1922 Park Avenue, NEW YORK CITY

York Unit Heaters

We Can Prove the Advantages of Floor Mounting for Unit Heaters

York builds both Floor Mounting and Overhead Suspension Unit Heaters. We have recently conducted smoke bomb tests under operating conditions, and now *know* exactly how warm air circulates. Since we build both types we were naturally unprejudiced in making the tests.

Our Bulletin C-25 illustrates and describes the actual results of these Smoke Bomb Tests. Write for it,—no obligation.

York Heating & Ventilating Corp.
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Sturtevant Silentvanes are the ideal fans for ventilation!

Sturtevant Silentvanes represent the greatest development in ventilating fans and are the choice of a great many architects and engineers because they give such remarkable results. In a large number of the country's most prominent buildings these fans are meeting all ventilating requirements successfully.

Silentvanes embody many desirable features among which are the ability to run at high speeds, high efficiency, and quietness of operation. But these are not the only salient points that make Silentvanes so popular.

The self-limiting horse power characteristic saves power and prevents motor overload. With this important feature it is no longer necessary to provide a motor with a horsepower capacity so much greater than the fan load requires in operation. Therefore, a considerable saving on motors is also realized.

Our new Silentvane catalog No. 290 contains information valuable to architects, engineers and contractors. Send for it now.

B. F. STURTEVANT COMPANY

Sales Engineering Offices

Atlanta, Ga. — Los Angeles, Cal.
Boston, Mass. — Minneapolis, Minn.
Buffalo, N. Y. — Montreal, P. Q.
Camden, N. J. — New York City
Chicago, Ill. — Pittsburgh, Pa.
Cincinnati, Ohio — Portland, Ore.
Cleveland, Ohio — Rochester, N. Y.
Dallas, Texas — St. Louis, Mo.
Detroit, Mich. — Salt Lake City, Utah
Denver, Colo. — San Francisco, Cal.
Hartford, Conn. — Seattle, Wash.
Indianapolis, Ind. — Toronto, Ont.
Kansas City, Mo. — Washington, D. C.

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Sturtevant, Wis. — Framingham, Mass. — Galt, Ontario

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Catton Neill Eng. & Mach. Co. — Manila
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Honolulu Iron Works Co., — Honolulu, T. H.
Blair, Reed and Co., Ltd. — Wellington
Wesselhoeft and Poor — Caracas
Wesselhoeft and Poor — Bogota
General Machinery Co. — Tampico
Pedro Maritino Inc. — Lima
Compania Italio-Americana de Importacion — Buenos Aires
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1360

WANTED

Advertisements under this heading, $2.00 per inch, payable in advance. A 1-in. advertisement contains 35 words. To secure insertion copy must be received not later than the 20th of the month preceding date of issue.

MANUFACTURERS' REPRESENTATIVES WANTED WHO ARE NOW CALLING ON THE HEATING TRADE, ARCHITECTS AND ENGINEERS IN WASHINGTON, BALTIMORE, DOVER, PHILADELPHIA, PROVIDENCE, MANCHESTER, PORTLAND, BUFFALO, PITTSBURGH, CLEVELAND, TOLEDO, CINCINNATI, INDIANAPOLIS, AND ST. LOUIS, TO SELL A HIGH-CLASS MAGAZINE-FEED BOILER THAT REDUCES THE EXPENSE OF HEATING BY BURNING THE SMALLER SIZES OF COAL AND COKE. BESIDES OFFERING UNMATCHED OPERATING CONVENIENCE. STRAIGHT COMMISSION BASIS, WITH INCOMES ONLY LIMITED BY EFFORTS SPENT. CAN BE WORKED PART TIME AT FIRST, BUT WILL SHORTLY OUTGROW YOUR PRESENT CONNECTION. OUTLINE FULLY EXPERIENCE, ETC., FURNISHING SEVERAL REFERENCES IN MAKING REPLY. ADDRESS BOX 44, CARE OF HEATING AND VENTILATING MAGAZINE,, 105 SOUTH DEARBORN ST., CHICAGO, ILL.

FOR SALE—Pipe machine. Cuts and threads from 1-in. to 8-in. pipe. Complete, with motor and dies, $450.00. Machine is in first-class running order. Address Ogden Plumbing and Heating Service Co., 1854 South Ogden Ave., Chicago, Ill.

POSITION WANTED.—Young married man with seven years' experience in drafting, masuring and scheduling automatic sprinkler systems, desires position with concern in the east. Address Box 41, care of Heating and Ventilating Magazine.

SALES REPRESENTATIVES WANTED.—A company which has been in existence for over 40 years, making a nationally-advertised heating specialty specified by the leading architects and consulting engineers everywhere, has a few localities open where they can use the services of a hustler, preferably one who is in touch with engineers, architects, plumbing and heating contractors, etc. No objection to your handling other related, but non-competitive lines. We are large advertisers and back our men with every possible sales assistance, making it a most desirable and profitable line for any sales engineer. All letters will be considered strictly confidential. Address Box 42, care of Heating and Ventilating Magazine.

ENGINEERS WANTED.—A combined engineering and construction organization located in eastern United States has an opening for an engineer experienced in the design and installation of building service equipment, including heating, ventilating, plumbing, elevators an dsprinklers. Desire a man under 35 who has had experience in meeting clients and in estimating and specification work, as well as a thorough detail knowledge of design. Write fully to Box 43, care of Heating and Ventilating Magazine, 1123 Broadway, New York, enclosing photograph and full particulars as to training, experience and salary expected, together with references.

SALESMEN WANTED—A prominent manufacturer of cast-iron boilers and radiators is in need of experienced salesmen for openings in several sections of the country. Liberal compensation. Kindly give age, education and experience. Address Box 34, care of Heating and Ventilating Magazine.

"Readers Announcement"

Our Educational Service is being extended to readers of THE HEATING AND VENTILATING MAGAZINE. It is for Manufacturing and Contracting folks, as Employers, Draftsmen, Salesmen, Mechanics, Clerks, Apprentices, etc.

Since 1910 the St. Louis Technical Institute has taught quite an army of folks desiring to improve their opportunities. Our courses are Modern, Comprehensive and Official, and designed to give you those higher touches your profession requires.

We Teach You In Your Own Home, Personal, Clear, Direct

Our School Directory sent Free to interested parties. Indicate your Course when writing.

HEATING VENTILATING ENGINEERING
SPECIAL STEAM AND WATER HEATING
PLUMBING DESIGN AND INSTALLATION
WARM AIR HEATING
CONTRACTING AND ESTIMATING
MECHANICAL DRAFTING

Start with the Spring School Season

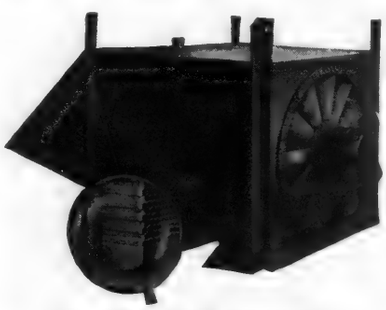
ST. LOUIS TECHNICAL INSTITUTE
4541 Clayton Ave., St. Louis, Missouri

WHY LET THAT UNHEATED BUILDING WORRY YOU

We manufacture Unit Heaters and Fan Heating Systems for every need. If steam is not available, our all steel direct fired Fan Furnace will meet your requirements.

Send us your heating problems and we will show you the easiest and cheapest way.

Recommendations and prices furnished cheerfully without cost to you.



COMET UNIT HEATER

Suitable for use where steam and hot water is available. This Heating Ace is especially adapted where compactness and lightness in weight is of importance. For complete description write for Bulletin No. 85.

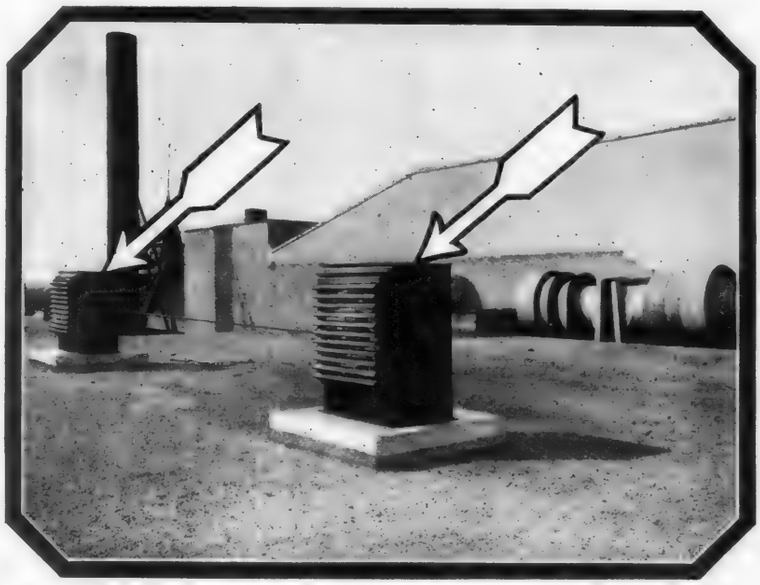
DIRECT FIRED FAN FURNACE

For use where steam or hot water is not available. For complete data write for Bulletin No. 90.

THE NEW YORK BLOWER COMPANY

CHICAGO, ILL. ***Branch Offices in Principal Cities*** **LA PORTE, IND.**

Positive Ventilation - *in any kind of weather*



HIGH EFFICIENCY TRADE ILG MARK VENTILATING MACHINERY

Power Roof Ventilators

are *Positive* because they are *Power* Driven!

VENTILATION with an ILG Power Roof Ventilator is dependable in any kind of weather. There's no variation in efficiency — the rate of air change is mechanically positive and electrically controlled.

The all important feature is the ILG Self-cooled Motor Propeller Fan with a fully enclosed motor which can be safely operated in high temperatures and is not exposed to the evils of dirt and grease which eventually decreases the efficiency of the ordinary open or semi-enclosed motor.

The ILG Power Roof Ventilator is made, tested, sold and guaranteed as a complete unit. The heavy duty pent house is a distinctive ILG product equipped with the ILG Automatic Aluminum Shutter which opens and closes simultaneously with the starting and stopping of the fan.

Write for new illustrated bulletin. Of special interest to architects, engineers and contractors

ILG ELECTRIC VENTILATING CO., 2858 N. Crawford Avenue, CHICAGO, ILL.

HIGH EFFICIENCY TRADE ILG MARK VENTILATING MACHINERY

Ventilation

for Stores, Offices Factories, Public Buildings Restaurants, Theatres, Homes, etc.

FEED WATER HEATERS
STORAGE HEATERS
FUEL OIL HEATERS

WHITLOCK HEAT TRANSFER PRODUCTS

INSTANTANEOUS HEATERS
CONVERTORS
HEAT EXCHANGERS

HAVE YOU EVER WONDERED—?

how much hot water to allow for each shower bath in a hotel?

how much hot water is needed in apartment houses of various sizes?

how thick a heater shell should be for extra high working pressures?

how a water heater should be built and tested?

how to specify just the type of heater the particular job requires?

If you have, you are urged to write for the new Whitlock Data Sheets and stop wondering.

"HOT WATER?—LET WHITLOCK DO IT"

THE WHITLOCK COIL PIPE COMPANY, 40 South St., Hartford, Conn.

New York Boston Philadelphia Chicago Baltimore San Francisco
and other principal cities. Consult telephone book.

WHY NOT USE THE LATEST?

1926 IMPROVED MODEL

KNOWLES *Nu-Notch*
REG. U.S. PAT. OFF.

Mushroom Air Diffuser for Auditoriums

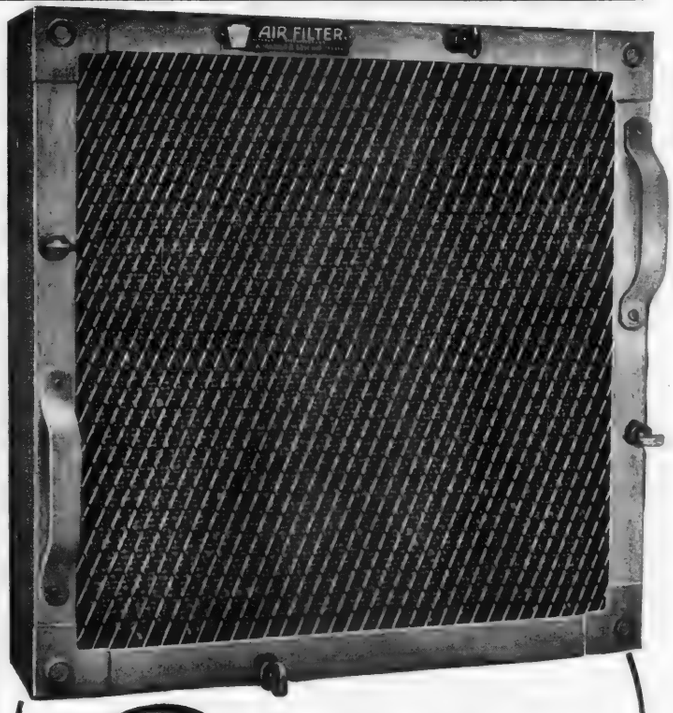
The success of Knowles Mushroom Ventilators is attributed not only to the care with which they are made but to the belief that there is always room for improvement. They have always been efficient but have not been allowed to become a set product. We now offer the 1926 "Nu-Notch" model, the finest model of them all.

Rigid; simple, having only two parts; strong; and more efficient. Easily adjusted from wide open to completely closed. No set screws.

Let us send full details.

Knowles Mushroom Ventilator Co.

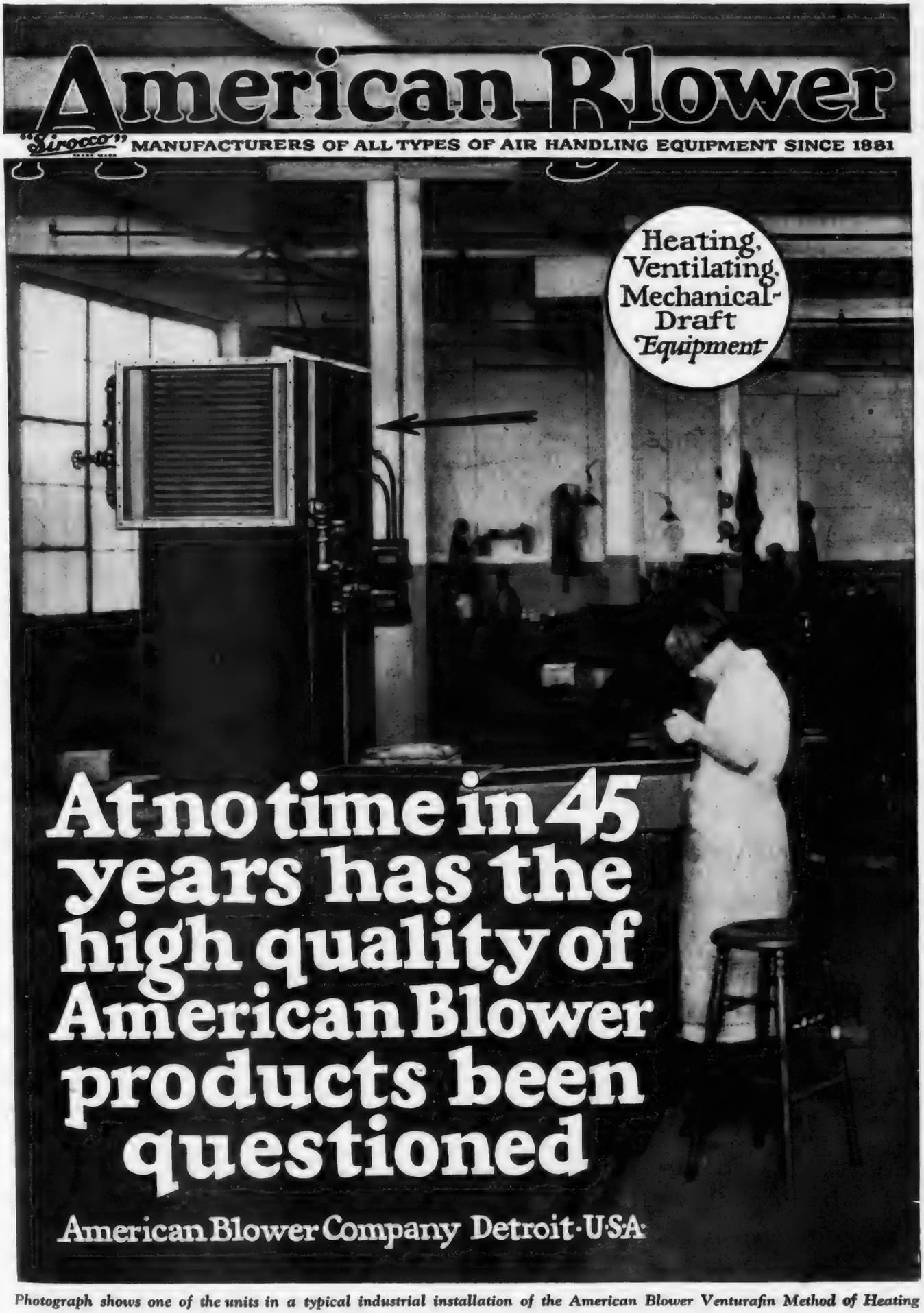
202 Franklin St. New York



DURO COPPER MEDIA

TRADE DURO MARK ALL METAL AIR FILTER CO.

3151 Shields Ave., Chicago, Ill.

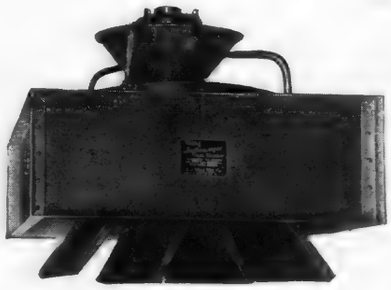

American Blower
"Sirocco" MANUFACTURERS OF ALL TYPES OF AIR HANDLING EQUIPMENT SINCE 1881
Heating, Ventilating, Mechanical-Draft Equipment
At no time in 45 years has the high quality of American Blower products been questioned
American Blower Company Detroit·U·S·A·

Photograph shows one of the units in a typical industrial installation of the American Blower Venturafin Method of Heating

WING

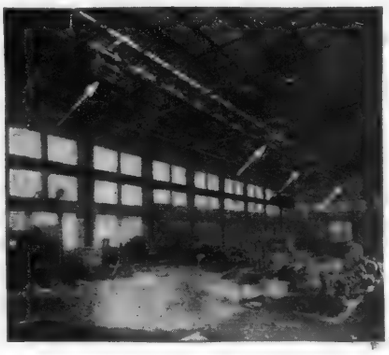
Featherweight

UNIT HEATERS



FOR INDUSTRIAL PLANT HEATING

Installed overhead, eliminating costly pipe trenches, saving valuable floor space, this equipment fits any type of industrial building. By removing the heated air that tends to collect under the roof and projecting it towards the floor, a marked economy is effected in reducing the heat transmission losses through the roof. No structural strengthening is required.



The cut shows an installation of the High Ceiling Type, in a Railroad Car Shop. Note the clear floor and the simple piping.

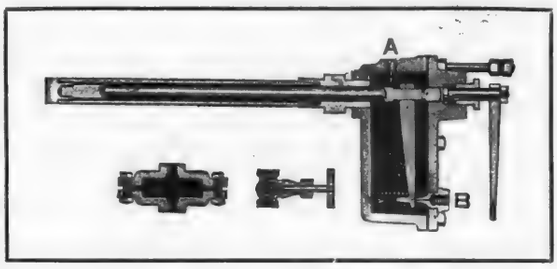
L. J. Wing Mfg. Co.

Fans and Exhausters — *Forced Draft Blowers*
Small Turbines — *Damper Regulators*

Hudson & 13th St. New York City

Quality **KIELEY** Simplicity

REGISTERED TRADE MARK



A Hot Water Temperature Controller that operates with one steam valve.

Hydraulic control regulates the steam supply to the heater and eliminates the extra reducing valve generally required where pressures exceed 25 pounds.

Send for Bulletin

KIELEY & MUELLER, Inc.

34 West 13th St. New York City

THE

D & D

Safety Boiler Control

A positive, simple, reliable and inexpensive control to be used with Oil Burners to prevent the boiler from becoming overheated. It stops the oil burner as soon as the boiler becomes excessively hot.

No more burned out Boilers or cracked Sections due to insufficient water.

Catalogue upon request.

Manufactured by

DAVIS & DAGGETT CO.

238 Dwight St., Springfield, Mass.

Highest Endorsements of Oil Burner Manufacturers.

Opportunity!
Sales Engineers

If you are a sales engineer, or an engineering salesman—if you have, or can cultivate a worth-while acquaintance among industrial concerns—if you want to extend your present business on a sound basis, or—if you want to build a profitable, growing business of your own—you will be interested in the exclusive territorial sales representation of the

PECCO LINE

of Unit Heaters, Ventilators and Dust Collectors for Industrial Plants, Factories, Foundries

WE NEED

1. Engineering sales representatives with a sound general knowledge of heating and ventilating, or sufficient background to acquire it readily under our training and guidance.

2. The sales ability to present an honest selling proposition in an honest, straightforward manner—the only selling "secret" we know.

3. The necessary executive and mechanical ability to "follow through" on installations after orders have been secured.

4. The ambition and energy to build up a worth-while profitable business—on a "main line" basis rather than "side line."

WE OFFER

1. Exclusive territorial sales rights on a line of unit heaters, ventilators and dust collectors whose continuous satisfactory performance has been amply demonstrated as second to none in the field.

2. An honest sales and installation-service policy that insures your business future because it makes new friends, holds old ones.

3. An adequate advertising program consisting of publication and direct-mail efforts, consistently and intelligently applied in the interest of our sales representatives.

4. A co-operative training service—covering both sales and installations—including direct home office assistance when needed.

An Established Business Serving a Wide Field

The unit heater and ventilator idea is accepted. It is applicable to practically every industrial plant and factory. The field is open—sales possibilities are attractive—individual sales averaging from $500.00 to $1500.00 each. "Repeat" orders come naturally. ' ' Pecco, Inc. is an established, going concern with a substantial, progressive business record. Its officers and engineers are nationally recognized experts.

We are interested particularly in those men who value their future to the extent that they will make a thorough investigation of our product and our policies. Write today for preliminary details—all replies strictly confidential.

PECCO, Inc. ' 2980 N. Market St. ' St. Louis

"No Radiation is Needed to Heat this Factory"

WHEN the question of *plant heating* is being considered, before you contract for an elaborate steam or hot water system with its costly radiation, investigate the Mueller Direct-Fired Forced Air Unit.

Engineers and plant owners find that this forced air unit heater not only gives more satisfactory heating and ventilating service, but is also far more economical in first cost and maintenance. It requires no radiation. Burns low grade fuel. No danger of freezing, breakages or shut-downs. You don't need a licensed engineer to run it.

The Mueller Unit provides a positive circulating system for peak loads and quick heating periods and a gravity system for night operation or when building is unoccupied. It may be operated singly, in independent units, or in batteries, to obtain satisfactory temperature. Forced circulation assures movement of a large volume of air throughout plant. Infiltration vitalizes air already in building. Efficiency of workmen is increased because stagnant air is eliminated.

Write for descriptive literature and let our engineering department confer with you regarding your heating requirements.

L. J. MUELLER FURNACE CO.
Established 1857
267 Reed Street
MILWAUKEE, WIS.

Branch Offices: Baltimore, Chicago, Detroit, St. Louis, St. Paul, Minneapolis, Fort Collins, Colo., Salt Lake City, Portland, Seattle.

MUELLER
Direct-Fired Forced Air Unit

GORTON PRODUCTS

Just off the Press.

Our New

84-page Catalog* and Heating Data Book on

"Gorton Heating Products"

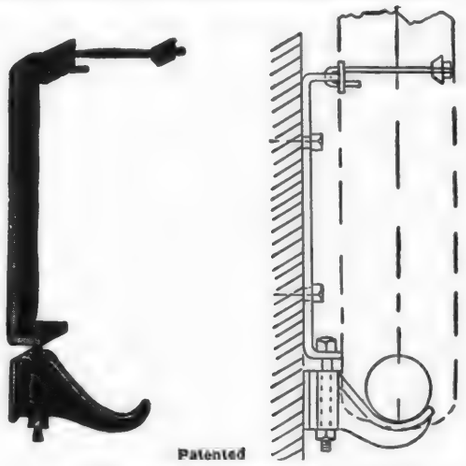
is just off the press. We should like to reserve a copy of the first edition for your use. Early application will insure prompt receipt free of any cost.

Contains original heating data of practical value for reference purposes.

**Tells all about the Gorton Single Pipe Vapor Heating System and Gorton Quarter Turn Packing Lock Radiator Valves.*

Address

Gorton & Lidgerwood Co.
Publicity Department
96 Liberty Street, New York, N. Y.
Established 1887



Patented
No. 9 Bracket for Legless Column Radiation

All That A Radiator Bracket Should Be

Gleockle Radiator Brackets are designed and constructed by men who are thoroughly familiar with radiator bracket requirements. They are all that a radiator bracket should be. They are safe, convenient, durable, adjustable, easy to erect, inexpensive, invisible after erection and will fit any make of wall radiator.

Send for descriptive booklet and trade discount

FIT ANY MAKE OF RADIATOR

A. F. GLEOCKLE, Jr.
415 Bay Street, Rochester, N. Y.

Suspends from Steam Line

Simplest of all Industrial Heating Installations

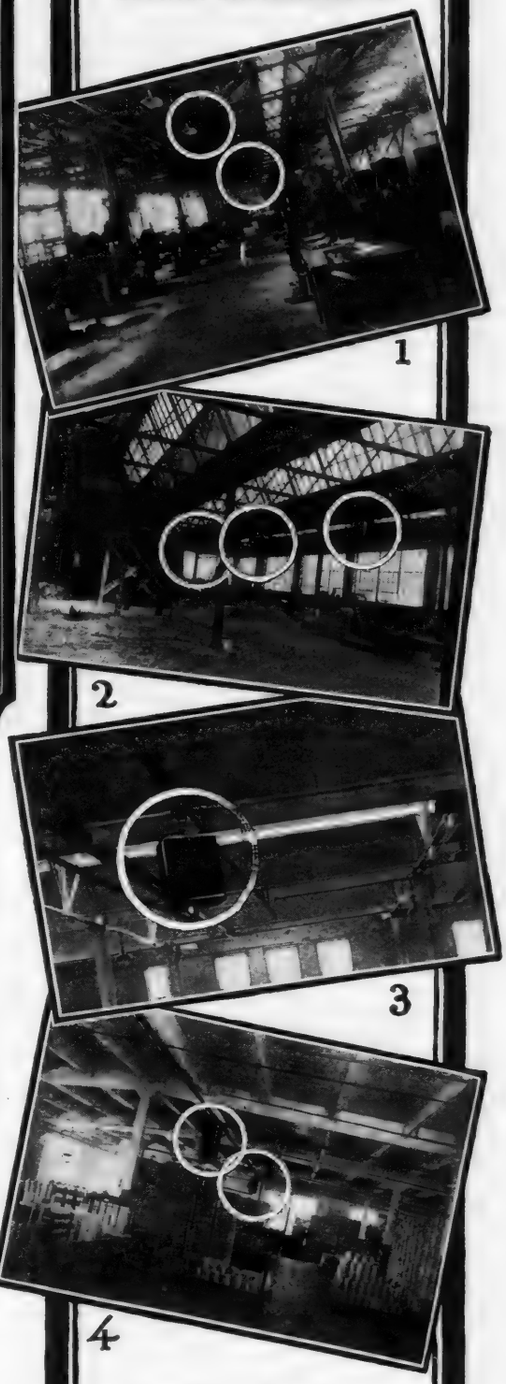
FOR the sake of installation economy as well as heating advantage, the Modine Unit Heater merits your thoughtful consideration. It simply suspends from the overhead steam or hot water supply line, at any discharge level desired, by means of a length of pipe and a union. No brackets, braces or structural supports required. Occupies less than 4½ cubic feet of space. Instead of handling and supporting *tons* of dead weight you work with *pounds*—for each Modine Unit weighs only 125 lbs., yet equals the heating capacity of 700 square feet of direct radiation. Delivers 2000 cubic feet of heated air per minute *in any direction desired.* At 60° room temperature, the B. T. U. discharge is 165,000 per hour. Easily installed in 30 minutes—which often means days saved on a heating system installation.

Write for Bulletin "A" which has all the facts.

MODINE MANUFACTURING COMPANY
Heating Division ThermModine *Racine, Wisconsin*

MODINE
UNIT HEATER
for Steam or Hot Water Heating Systems

Typical Modine Unit Heater Installations:



1 —Factory; 9,000 square feet; 4 Modine Units.

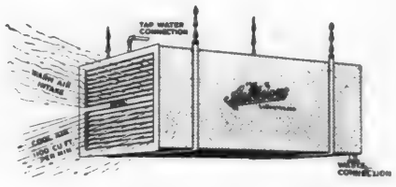
2 —Machine Shop; 10,000 sq. feet; 5 Modine Units.

3 —Public Garage; 11,000 sq. feet; 3 Modine Units.

4 —Varnish Packing Room; 6,000 square feet; 2 Modine Units.

COOL!

The Aerodore
GAMES SLAYTER SYSTEM



The Aerodore cools, washes out dust, and odors, controls humidity.

Any home, office or kitchen can be kept below 80° in the hottest weather.

Simple in construction, operated entirely by city water, no electrical or other connections necessary.

Write today for descriptive folder.

Announcement

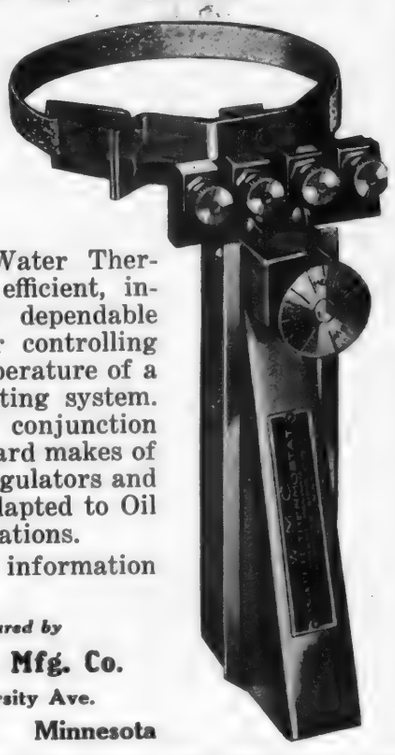
We are now ready to ship a sample, of a complete oil burning warm air furnace unit, to a few responsible dealers. This unit has been under development for five years and we expect to be in production on January 1, 1927. (Inquiries solicited).

Games Slayter
Industries

Lafayette **Ind.**

W-M-C
Water Thermostat
For Dual Control

Clamps on the Riser



The W-M-C Water Thermostat is an efficient, inexpensive and dependable instrument for controlling the water temperature of a hot water heating system. It operates in conjunction with the standard makes of electric heat regulators and is especially adapted to Oil Burner installations.

Write for full information and prices.

Manufactured by

The White Mfg. Co.
2362 University Ave.
St. Paul, Minnesota

E Z
RADIATOR HANGER

WHY waste time setting anchor bolts accurately? Use E-Z Hangers and put the anchor bolt in **about** the right place.

The E-Z adjustment with a ½ inch pipe takes care of both heighth and lateral variations.

Style R

HEALY-RUFF CO.
772 Hampden Avenue
ST. PAUL, MINN.

"A big help to Customers"

Front View of Unit showing Radiator.

Rear View of Unit showing Motor and Fan.

For Heating Industrial Buildings

Features of the Peerless Unit System:

Quicker and more uniform diffusion of heat.

Better control of room temperature. Room can be heated quickly by starting the motors. If too warm, heating can be suspended quickly by stopping the motors. No waste of heat when not needed.

Big saving of floor, ceiling and wall space; better appearance. Four Peerless Units in a large room or workshop will take the place of hundreds of square feet of ordinary radiation.

No waste. Unit heating is faster, and far more uniformly distributed, yet it causes no extra drain on the boiler. No more heat units are required; no more coal; no extra expense.

Lower first cost. Less expensive steam piping. Easier installation.

Can be installed in old buildings as readily as in new ones.

Automatic control of room temperature can be provided by means of a thermostat (extra equipment), which shuts off the heat by stopping the motor and turns it on by starting the motor.

Maximum heating effect is secured by means of a specially designed radiator—obtainable only in Peerless Industrial Units.

Cost of electric current for the motor is negligible.

Where special provision for ventilation is desirable, the necessary extra equipment can be furnished as required—wall boxes or ducts for bringing in fresh air from out-of-doors; mixing dampers for regulating the volume of ventilation; etc.

Peerless Industrial Heating Units are built by the *pioneers in unit ventilation,* in the same plant that turns out the well-known PeerVent Unit System of Heating and Ventilating. Heating-ventilating units built by this Company twelve years ago are still giving trouble-free service year after year.

Write for detailed information. Please wire collect if you wish to see our representative.

CHICAGO
808 Monadnock Bldg.

PITTSBURGH
339 Second Avenue

BOSTON
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CLEVELAND
1836 Euclid Avenue

SPRINGFIELD, MASS.
196 Worthington St.

DETROIT
723 Lafayette Bldg.

DES MOINES
520 Securities Building

PORTLAND, ORE.
927 Board of Trade Bldg.

TORONTO, CANADA
Darling Bros., Ltd., 77 York St.

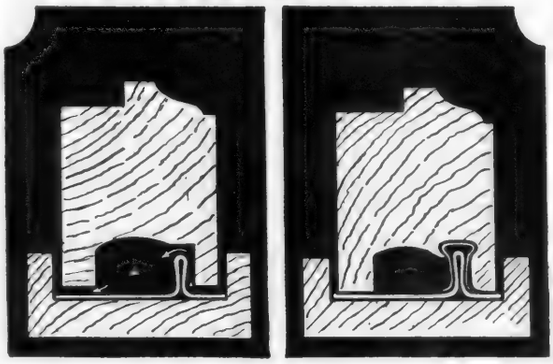
Peerless Unit Ventilation Co., Inc.

Pioneers in Unit Ventilation

Skillman Ave. & Hulst St., Long Island City, N. Y.

PEERLESS
Industrial HEATING UNITS

HIGGIN
ALL METAL
WEATHER STRIPS



Ordinary single-member strip Sash grooved for cord

The exclusive Higgin Insert Strip completes the job

Are you recommending the right weather strips?

The only weatherstrips made with a self-holding spring-flange **Insert** are Higgin All-Metal Weatherstrips.

No window without this **Insert** can be as draft-tight as a Higgin-equipped window. The illustration shows why.

The spring flanges of the **Insert** lightly grip the sides of the raised rib and close the space around the sash at every point.

There is no air leakage where the sash is cut out for the cord, nor seepage around the rib when the sash shrinks. The metal-to-metal contact insures a perfect fit and closure; also an easy-sliding sash under all conditions.

A Higgin Installation means added comfort, greater fuel saving, increased satisfaction with the heating system.

HEATING ENGINEERS! You can safely guarantee a definite heating efficiency for your equipment when Higgin All Metal Weatherstrips are installed. They keep all the cold air out and all the warm air in. They never lose their close fit by warping or shrinkage of frames. Every job is installed by trained Higgin men and guaranteed by the Higgin organization. Recommend Higgin All-Metal Weatherstrips to your customers.

The **HIGGIN** *Mfg. Co.*
Newport, Ky.
Toronto, Canada.
Manufacturers of Higgin All-Metal Weatherstrips and Higgin All-Metal Screens

No Excuse For Cold Apartments

A sudden drop in outside temperatures soon brings discomfort indoors unless the heating apparatus is aligned with the changes.

BRISTOL'S
Atmospheric Temperature
RECORDER

places a continuous record of outside temperatures before the engineer. A glance at the chart tells him of any change before he is otherwise aware of it.

Knowing in advance, he is prepared for the emergency and no inconvenience is experienced by the tenant.

Ask for Bulletin N-1103.

The Bristol Company *Waterbury, Connecticut*

FOR 36 YEARS — Ask Any Technical Engineer — MAKERS OF

BRISTOL'S RECORDING INSTRUMENTS

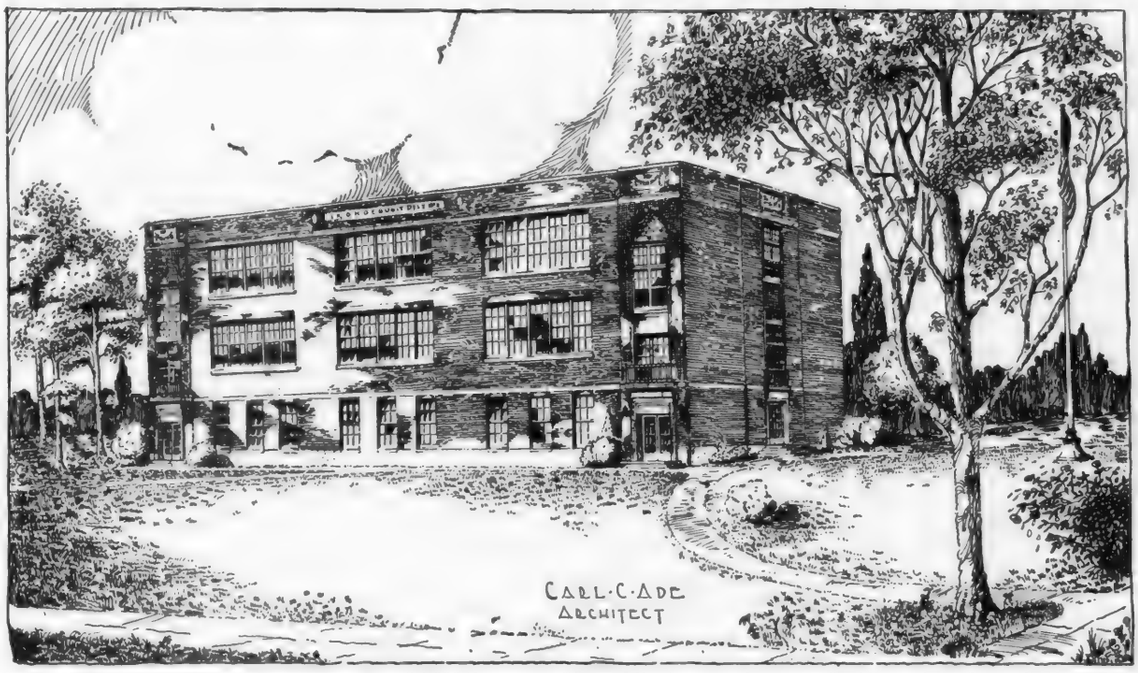
NEW PATENTED HARTMANN ADJUSTABLE RADIATOR BRACKETS

Dependable! Adjustable!
Economical! Accurate!

Write for Dimensions and Price List

CHARLES HARTMANN CO.

975-993 Dean Street BROOKLYN, N. Y.



DISTRICT NO. 2 SCHOOL—IRONDEQUOIT, N. Y.

Architect, Carl C. Ade, Rochester, N. Y.
Heating Contractor, Arnsmeyer-Warnock-Zahrndt, Inc., Rochester, N. Y.

This New School Building is Now Being Equipped with Buckeye Heatovents

ARCHITECTS and builders everywhere are enthusiastic about the appearance of the Buckeye Heatovent.

It is finished with the same care and workmanship as any fine piece of furniture or expensive automobile. The Buckeye Heatovent, unit system of heating and ventilating, is made in any finish and will harmonize with the interior of your particular building.

Upon request we will send you an illustrated booklet giving full information about the Buckeye Heatovent.

Buckeye Heatovents incorporate the latest and best engineering principles and are constructed of the very highest class materials and workmanship. These features, together with that intangible asset "Buckeye Service" insure your clients against poor ventilation and future repair bills.

Full description and detailed drawings are to be had in our data book for architects and engineers, available on request. But our complete service includes, also, that of co-operation on the part of members of our engineering staff, who will consult with you on your heating problems.

Our new catalog is now ready. Write for your copy now.
Any of our Branches can supply you.

THE BUCKEYE BLOWER CO.

COLUMBUS, OHIO

BRANCH OFFICES:

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321 Jackson Bldg., Buffalo, N. Y.
301 Rose Building, Cleveland, Ohio.
401 Transportation Bldg., Chicago, Ill.
1226 California St., Denver, Colo.
3115 N. Central Ave., Indianapolis, Ind.
1011 Pioneer Trust Co. Building, Kansas City, Mo.
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321 Bulletin Bldg., Philadelphia, Pa.
709 Columbia Bank Building, Pittsburgh, Pa.
210 Dooly Building, Salt Lake City, Utah.
Fales Building, Seattle, Washington.
206 Comstock Ave., Syracuse, N. Y.
1101 Realty Building, Youngstown, Ohio
250 Columbia St., Detroit, Mich.

Weil

Safety-Vent Vapor Regulator

POWER IS ITS MIDDLE NAME

Makes any Vapor or Modulating System safe and satisfactory. Sensitive to the slightest change in pressure. Has ample power to control the dampers with a good working margin.

Full power of regulator is exerted within a pressure range of two or three ounces.

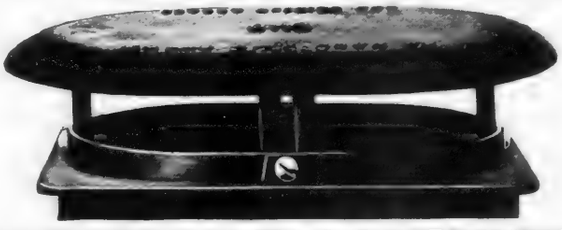
The Safety Vent Valve is a distinguishing feature of this regulator and takes care of air from entire heating system.

Tested and carefully adjusted before leaving factory, ready to be connected up and put into service, with the least trouble and expense.

All working parts of cast bronze. Will last as long as the boiler, or any other part of system.

Write for details

SIMPLEX HEATING SPECIALTY COMPANY, Inc.
LYNCHBURG, VA.



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ADJUSTABLE MUSHROOMS

Round 8" and 10" Fully and easily adjustable Rigid and Rugged Cast Iron

ÆOLUS DICKINSON CO.
3336-44 S. Artesian Avenue
CHICAGO

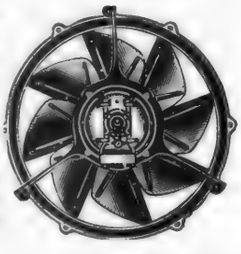
Oval 8" x 12" With our labor aving square bottom Saves money in installing

JAMES M. SEYMOUR

Established 1888

Lawrence St., Mechanic St. and Kirk Place, NEWARK, NEW JERSEY

AUDITORIUM FANS, 36" to 120" to fit any square opening. SEYMOUR FANS sold subject to substantial discount. Furnished with suitable pulley or coupling for direct connection TWIN FANS include shafting and center bearing.
Special Fans for Cooling Towers, Heating Systems, Induced Draft, Forced Draft, Dry Rooms, Dry Kilns.



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MANUFACTURED WEATHER makes "Every day a *good* day"

Humidification · Dehumidification
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Universal Heating and Ventilating Unit

Now Obtainable Through

American Blower Offices

By exclusive contract arrangement between John J. Nesbitt, Inc., Atlantic City, and the American Blower Company, Detroit, The Universal Unit Ventilating System is now handled by the nation-wide American Blower sales and engineering organization.

In this way there will be made available to present and prospective users of the Universal Unit the country over, the close contact and expert attention to ventilating and heating needs that we have, for 32 years, endeavored to furnish to our good friends and users.

The Universal Unit will be offered exclusively through American Blower Sales Offices, except in the states of Connecticut, New Jersey, Maryland, Eastern Pennsylvania, and in Metropolitan New York, where we will continue to operate our sales offices.

The Universal Unit has been in successful operation in many schools for 9 or 10 years. From any standpoint—lower initial cost, effective control of temperature, reliability, simplicity, and economy—it is the ideal method for schools and other public buildings.

Write for complete information, which will be furnished direct or through the nearest American Blower Office.

John J. Nesbitt, Inc.

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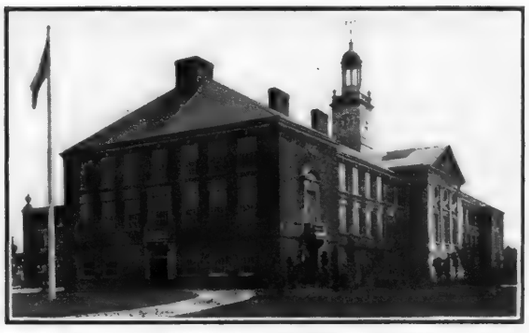
ATLANTIC CITY, NEW JERSEY

405 Lexington Ave.
NEW YORK CITY



South Side High School, Rockville Center, L. I., N. Y.
Huse Templeton Blanchard, Architect

SPENCER CLEANED—

Two representative installations of the Spencer System of Vacuum Cleaning are shown here; one in the East and one in the West.

There are many such installations in public schools and colleges the country over, and the wide acceptance and use of Spencer Systems in institutions of this type is the best evidence of their efficiency and dependability in solving the school cleaning problem.

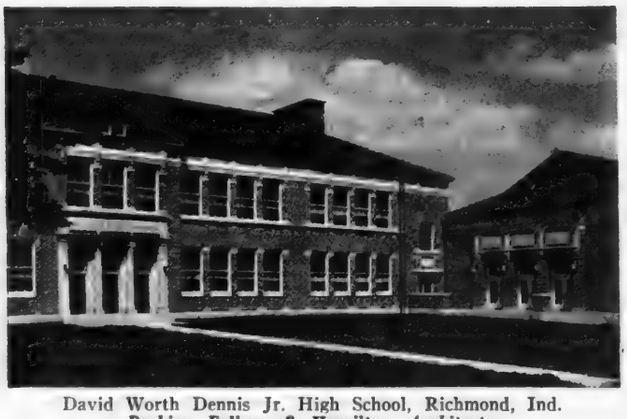
Spencer performance has established a confidence in the Spencer System of Vacuum Cleaning by many leading engineers which has resulted in its acceptance as standard.

The recommendations of our Engineering Department may be obtained on any cleaning problem without cost or obligation.

Write for list of school installations and complete data regarding Spencer Equipment.

SPENCER TURBINE CO.
HARTFORD, CONN.

SPENCER
CENTRAL CLEANING SYSTEMS



David Worth Dennis Jr. High School, Richmond, Ind.
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Equally Dependable

for STEAM, WATER, GAS, OIL or AIR

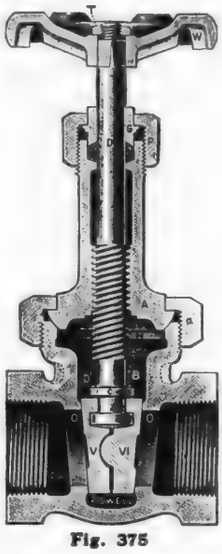

Fig. 375

POWELL White Star Gate Valves

Double Wedge Powellium Nickel Discs.

Union Bonnet.

For 200 pounds, Extra heavy for 300 pounds W.S.P.

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Write us for information

THE WM. POWELL CO.
Dependable Engineering Appliances
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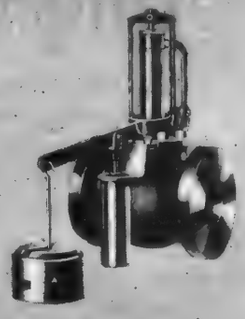
VALVE MAKERS FOR OVER FIFTY YEARS



THE first commercially successful pressure regulator was the Davis. Its basic design of fifty years ago has met all of the tests. It eliminated the spring, and balanced steam pressure by a weighted lever, allowing visible action and hand testing. Davis pressure regulators are still giving the high type of dependable service which gained instant acceptance for them over a half century ago.

The Davis Pressure Regulator is dependable because it is mechanically simple. Pressure balanced by weight—not by springs which may deteriorate. An oil dash pot gives steady service without chattering. And the lever makes its action visible—you can test it by hand.

DAVIS VALVE SPECIALTIES
STEAM-SAVERS SINCE 1875

G. M. DAVIS REGULATOR CO. 421 Milwaukee Avenue, Chicago, Ill.

Fifth Avenue prefers Carrier Air Washers and "Buffalo" Fans—

Where New York builds its finest structures, where all that is modern may be seen, where beauty, comfort and utility approach perfection, in short; — on Fifth Avenue, Carrier Air Washers and Buffalo Fans will be found in a large percentage of the newer buildings.

This popularity is not accidental nor is it due to low price. Efficiency and long-life were the first considerations in every installation, and quiet operation and simplicity were essential.

If you do not have our catalogs in your files, a line will bring them.

McCutcheon's—

The beautiful new McCutcheon store, opened Oct. 28th, 1925, where Buffalo fans distribute tempered air for heating.

A few of the many others

Among other Fifth Avenue structures where Buffalo-Carrier equipment will be found are:—

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B. ALTMAN COMPANY
LORD & TAYLOR
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POSTAL LIFE INSURANCE BUILDING
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SAKS & COMPANY

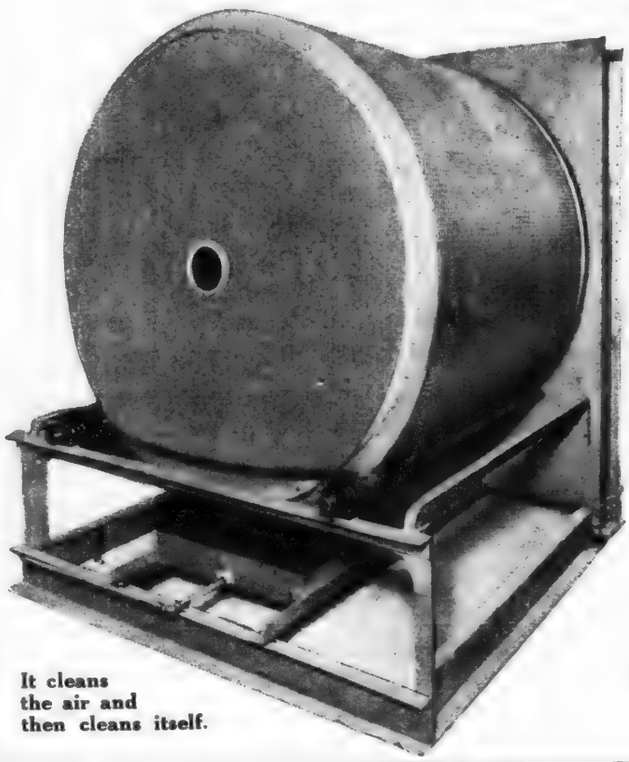
Buffalo Forge Company
Carrier Air Conditioning Company of America

480 BROADWAY, BUFFALO, NEW YORK

In Canada—Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

"Buffalo"—Carrier *for* complete heating-ventilating

The "National Rotary" Has Set New Standards Because It Has Set Engineers Thinking



It cleans
the air and
then cleans itself.

The Progressive Engineer investigates—and thinks. He never balks at a new thing just because it's new—his trained mind readily discriminates between basic merit and basic error. Service to his client demands that he give them the benefit of any new developments of merit—so he investigates.

The Progressive Engineer has long felt the need of a Self-Cleaning Air Filter—that's why he has been so ready to investigate the **"NATIONAL ROTARY."**

Here are some of the features that have set him to thinking—

High Cleaning Efficiency—made possible by a dense filtering medium,—can't see a ray of light through it. That's possible because it's never allowed to clog up with dirt.

Uniform Performance—the continuous washing process keeps the resistance and capacity constant.

Simple Mechanism—doing the work a human being is ordinarily expected to do—and a lot more industrious and reliable.

Minimum Upkeep—the lowest maintenance cost ever reached in air cleaning.

Get our new bulletin—and see if it doesn't start you to thinking.

National Air Filter Company

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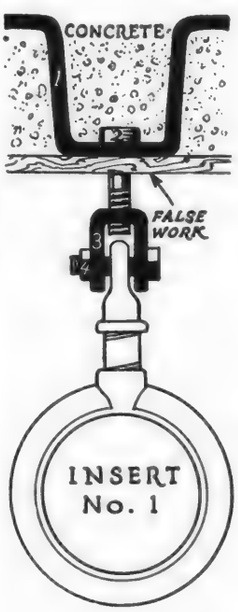


Little Giant Concrete Inserts

Contractors consider these facts before buying concrete inserts.

1. General Contractors will find the LITTLE GIANT INSERT the handiest they ever used for general work.

2. They are the simplest and easiest to install in places where it would be very difficult to use any other make of insert.

3. They are **strong** enough to hold weights up to one ton each.

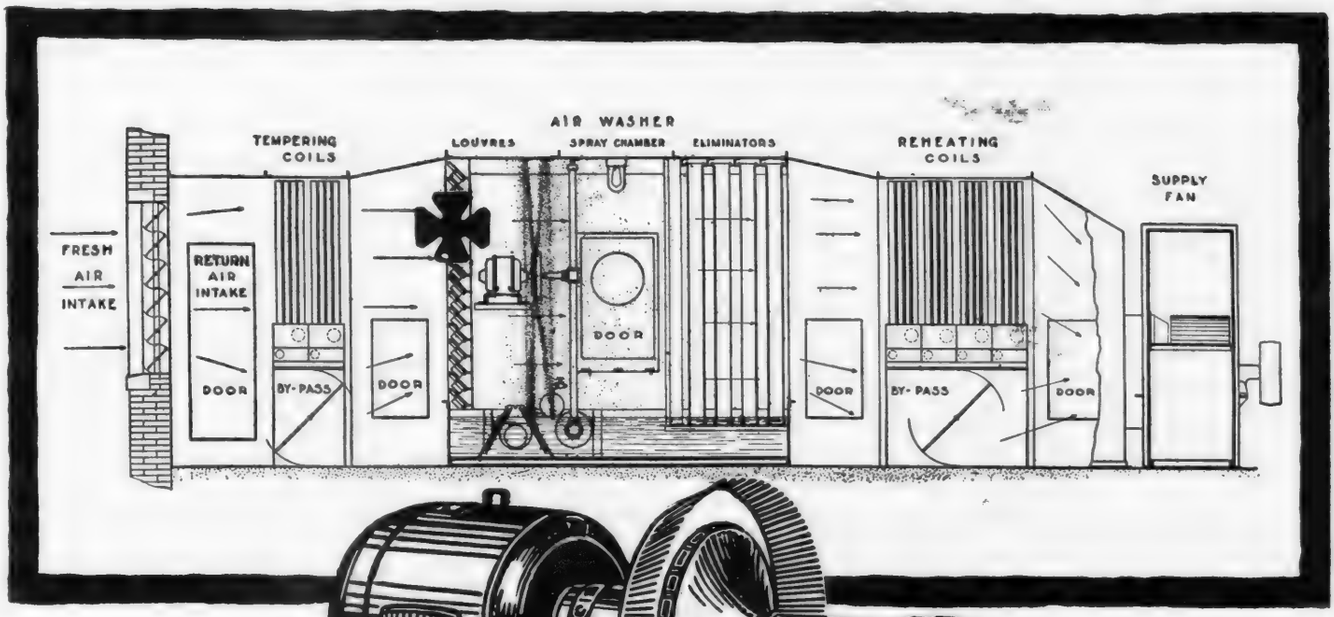
4. They may be used in floors, walls or ceilings for holding shafting and may be used in concrete beams without interfering with the reinforcing steel.

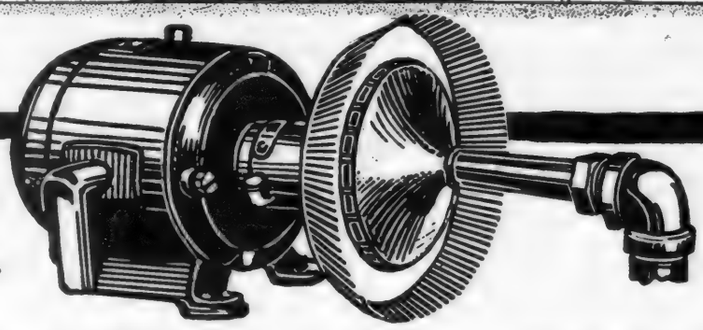
For further details write

The Little Giant Manufacturing Co.

1927-31 Nicollet Ave. Minneapolis, Minn.

The Bayley Turbo Air Washer Saves 40 to 60% Power Requirement





The Bayley Turbo Atomizer, the heart of the Bayley Turbo Air Washer

THE Bayley Turbo Air Washer operates at a water pressure of only 1¾ lbs. per square inch at the nozzle. Contrast this with the 10 to 30 lbs. per square inch water pressure needed on fine orifice nozzle spray banks; it means that the Bayley saves 40 to 60% of the power required to operate high pressure systems.

The remarkable operating economy of the Bayley Turbo Air Washer is possible because of the Turbo Atomizer—exclusive with Bayley. The Turbo Atomizer produces a uniform, dense spray through a combination of low pressure and centrifugal force. Water is delivered by a single fire type nozzle to the center of a rapidly revolving rotor or spray wheel where it is churned centrifugally into a solid mist screen. The Turbo Atomizer entirely replaces the bank of fine nozzles necessary in most washers. It requires only from 75 to 90% of the pressure required by the fine orifice nozzles and therefore saves from 40 to 60% of the power requirement.

Hartman Furniture Bldg., Chicago, Ill. A. S. Alschuler, Architect, Chicago; The Haines Co., Contractors, Chicago. A representative Bayley installation, consisting of Bayley Chinook Heaters, Bayley Plexiform Fans, and Bayley Turbo Air Washers.

Aside from its operating economy, the Bayley Turbo Air Washer has also the outstanding advantage of being non-clogging. The single, fire type nozzle (minimum diameter ¾") allows the passage of entrained solids without clogging. A single clogged nozzle in a multiple spray bank means a "hole" in the water screen, and several clogged nozzles so seriously interfere with the efficiency of the washer as to necessitate cleaning and reassembly, costly in time and money. Non-clogging and economical in operation—these are features that make the Bayley the most efficient air washer available today. Write for Bulletin No. 25 giving the complete facts.

BAYLEY MANUFACTURING CO., 750 Greenbush St., Milwaukee, Wis.

New York—Suite 503, 30 Church St. Buffalo, N. Y., 333 Jackson Bldg. Pittsburgh, Pa., Leiendecker Bros., Fulton Bldg., 2nd Floor. Cleveland, Ohio, 523 Penton Bldg. Detroit, Mich., Purcell Stone Co., 2847 Grand River Ave.. Chicago, Ill., 1156 1st Nat'l Bank. St. Louis, Mo., 1928 Railway Exch. Bldg. Kansas City, Mo., Mutual Bldg. Des Moines, Iowa, 521 Hubbell Bldg. Salt Lake City, Utah, P. W. Belcher, Dooly Blk.

Bayley
AIR ENGINEERING & EQUIPMENT
HEATING AND VENTILATING
AIR WASHING AND HUMIDIFYING SYSTEMS
MILL EXHAUSTERS — PRESSURE BLOWERS
MECHANICAL DRAFT FANS
AIR AND GAS SCRUBBERS
INDUSTRIAL DRYING SYSTEMS

The new Honeywell 15-20 Day Clock Thermostat is greatly reduced in size and is a marvel of simplicity and accuracy

Don't Miss This Chance To Sell Automatic Controls

EVERY call to a home that still controls its heating plant by hand is an opportunity to sell the householder on the numerous advantages of automatic heat regulation.

When you install a domestic heating plant, when you are called in to repair or clean one, don't miss the chance to secure this profitable business.

The new Honeywell Controls are so simple, so reliable that they operate accurately with the utmost regularity.

You realize this must be true when you discover that, of the important domestic oil burners listed as standard by Underwriters' Laboratories, Inc., a majority is equipped with Honeywell Controls.

Honeywell dependability means freedom from service annoyances. The home without them is depriving itself unnecessarily of an invaluable aid to comfort and convenience.

Sold only through the regular channels of the trade

HONEYWELL
Temperature Regulators

THE HONEYWELL HEATING SPECIALTIES CO.
WABASH, IND.

BOOKS ON HEATING AND VENTILATING

HOW TO HEAT THE HOME. By Norman Whitelaw, a book especially arranged and written to meet the needs of the average fitter and house heating contractor, deals with both steam and water heating and takes the reader through the job, including estimating, piping lay-outs, boiler selection, specifications and contract forms and notes on installation. Size 4½ x 7¼ in. Pp. 223. Cost $2.00.

PLUMBERS' HANDBOOK. By Samuel E. Dibble. This work contains valuable data for the heating engineer and estimator, architect, building contractor and sheet metal worker, as well as for the plumber. Each subject is treated by a specialist, the section on Pipe Standards and Pipe Dies by F. N. Speller and that on Heating by Alphonse A. Adler. Size 4 x 7 in. 629 pp. 316 ills. Cloth, $4.00.

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HOUSE HEATING WITH OIL FUEL. Presents in concise form the meat of the available information on the various phases of the problem of oil burners as a source of heat for homes. By P. E. Fansler, E.E., Associate Editor, The Heating and Ventilating Magazine. Second edition, 63 pages, with charts and illustrations. Price $1.00.

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THE HEATING and VENTILATING MAGAZINE
1123 BROADWAY, NEW YORK

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THE fact that 153 nationally-known companies have re-ordered Reed Air Filters—*a 93% increase in repeat customers during the past six months*—is conclusive evidence that Reed has the unqualified preference of users who demand highest cleaning efficiency at least cost.

Reed Air Filters are saving money for many companies in widely-diversified industries by protecting valuable machinery, work in process, delicate materials, perishable foods and the health of employes against the damage of dust and dirt.

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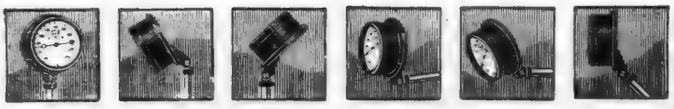
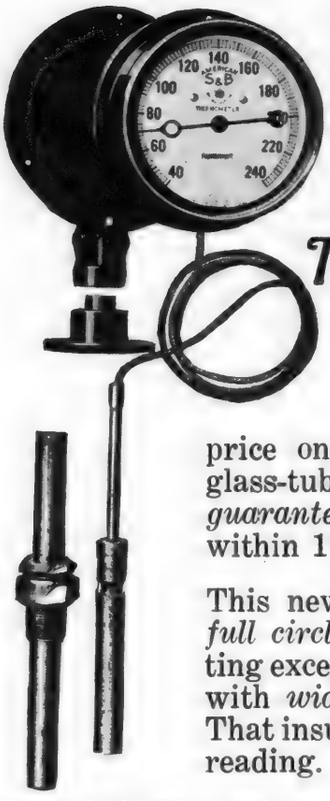


new!



An Accurate Low-Priced Dial Thermometer

Now comes the American *Dial* Thermometer at a price only a little above our glass-tube thermometers and *guaranteed* to be *accurate* within 1% of its range!

This new thermometer has a *full circle* 5 in. scale, permitting exceptionally *large figures* with *wide open sub-divisions.* That insures easy and accurate reading.

Furnished with any desired length of tubing wound on a reel in back, out of the way. It can be converted into a rigid stem thermometer, straight or angle, in a few minutes right in your plant. Bulb is adjustable for any length from 8-in. to 36-in.

Carried in stock for immediate shipment from any of our branches in ranges from minus 20° F. to plus 800° F.

The greatest thermometer value on the market! Interesting prices in quantities.

Send for further particulars and Catalog G-14.

AMERICAN SCHAEFFER & BUDENBERG CORP.
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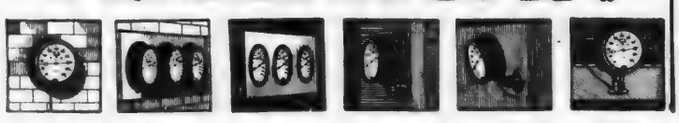

The STICKLE Thermostatic Radiator Valve

The Expansion principle in return line Radiator Traps is not novel or new. Consequently the difference in this class of Traps is in the construction.

The expansive movement of this diaphragm is fully one-quarter inch, which is much more than is necessary for opening and closing the valve. This gives a factor of safety which is greater than any valve made, consequently it requires no adjustment. May we send you our bulletin?

STICKLE STEAM SPECIALTIES CO.
INDIANAPOLIS, IND.

New York Office
46 E. 41st St.

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For Dependable Service

Specify

Kelly Automatic Steam Air Valve

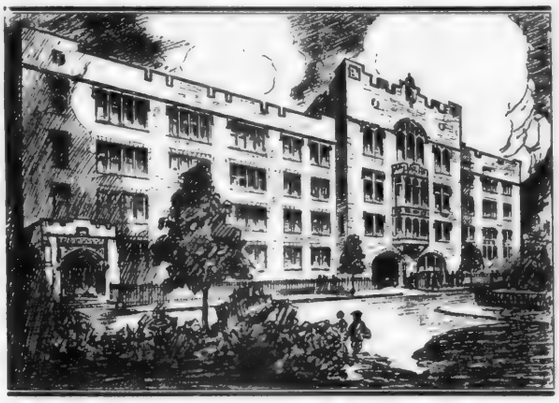
All Metal
Non-Adjustable

KELLY BRASS WORKS
226 West Ontario St.
Chicago, Ill.

Made in ⅛" standard pipe connection only.

Send for full details

Filtered Air and Its Applications



Erasmus Hall High School, Brooklyn, N.Y., equipped with Midwest Air Filters.

3. Schools

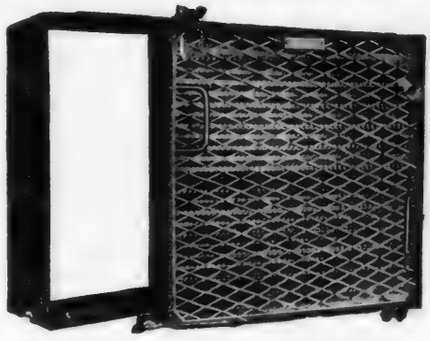
The bacteria and micro-organisms of every description always carried by the dust of city and suburban air constitute a menace to the health of school children that demands provision of air cleaning equipment in every school building.

Even the most robust children are subject to the attack of these organisms. Dust irritates the delicate tissues of the throat and lungs, and provides easy entrance and lodgement for the bacteria it carries. Then too, the carrier effect of dust must not be overlooked. Disease germs from infected children are carried by dust particles in air to others well out of range of their coughs and sneezes.

Of course the usual economic advantages of clean air apply in schools, just as much as in any other buildings.

Midwest Air Filters have long since proved their superiority in school ventilation by successful installations in private and public schools all over the country. Unsurpassed in cleaning efficiency, they cost less to operate, and are more dependable in service than any other equipment for the purpose.

Ask us to send a copy of our newest circular HC-1.



Cell and frame Type U-2 Midwest Air Filter

Some Outstanding Reasons for Midwest Superiority

Highest Cleaning Efficiency
due to the arrangement of the viscosine-coated filter sheets and knitted flat metal mesh fine cleaner, operating on the baffle impingement principle.

Low and Constant Operating Resistance
because of liberal openings in and between filter media, making them easy to clean, and preventing clogging.

Largest Dust Capacity per Unit
because of greater available filter content per cell.

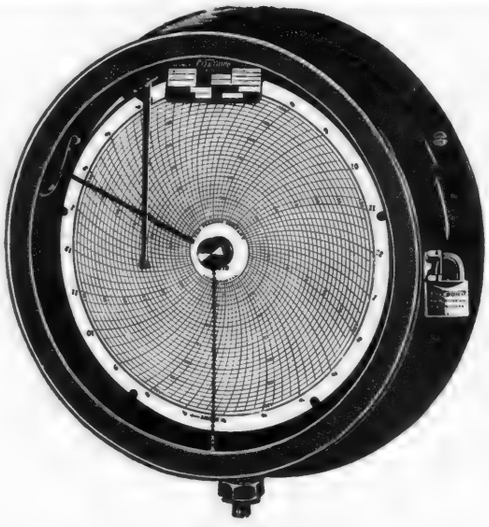
Standard All Metal Construction
in which each cell is an exact duplicate of all others. There is no sacrifice of efficiency to give low operating resistance or high capacity, nor of high capacity or low resistance to give high efficiency.

MIDWEST AIR FILTERS
INCORPORATED

Midwest Canada, Ltd.,
83 Craig St. West
Montreal, Canada

Bradford, Pa.
Offices in Principal Cities

Midwest Pacific, Inc.
Monadnock Building
San Francisco, California



Save One Man's Time—More Accurate Results

A large Pennsylvania steam heating company had always employed one man exclusively while testing condensation meters on all consumer lines. Several Foxboro Flow Meters now do this work. Tests are much more accurate. Also, these Foxboro Meters save one man's time at 50 cents an hour.

This company realizes that no engineer or production manager can improve conditions in his plant until he knows what they are. Foxboro Instruments show exactly what conditions are every minute of the day and night.

The use of these accurate, dependable instruments will enable you to increase production and to save men, money and materials.

What is your problem? Write or wire. Your case will be given individual attention.

THE FOXBORO CO., Inc.

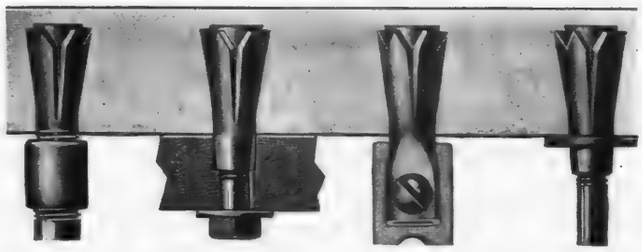
Neponset Avenue, Foxboro, Mass., U. S. A.

New York Chicago Boston Philadelphia Pittsburgh
Cleveland Rochester Tulsa Atlanta
Los Angeles San Francisco Portland, Ore.

FOXBORO

REG. U. S. PAT. OFF.

THE COMPASS OF INDUSTRY



Phillips Self-drilling Expansion Shells

For fastening all types of hangers to concrete ceilings, side-beams, columns and walls, and for bolting timbers and other equipment to concrete and stone.

Installing Self-drilling Shells in Concrete

Every shell is a drill and makes its own hole, thus eliminating drill trouble and expense.

A new sharp drill for every hole and a smaller hole per given size bolt reduces labor cost of installing to absolute minimum.

A perfect fitting hole and the enlargement of shell and hole at extreme bottom insures reliability and better workmanship.

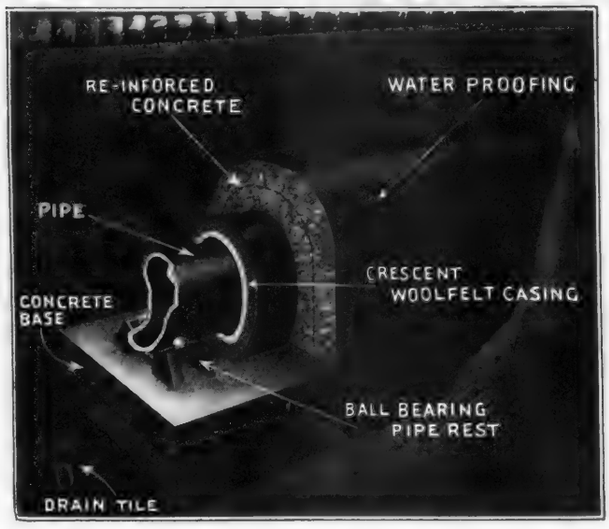
Quickly installed with the Phillips Spring Hammer, or with special hand chucks.

Ceiling with Phillips Spring Hammer Drill

Manufactured by

PHILLIPS DRILL COMPANY

1537 Cortland Street **CHICAGO, ILL.**

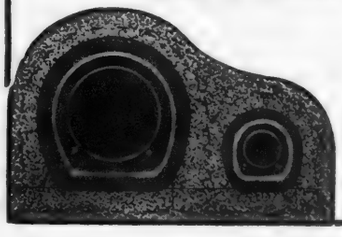


THE CRESCENT SYSTEM

Dirt-Proof Ball Bearings, and Air Space Around Pipe, Permits Rotation of the Pipe, Adding Years to its Life.

Manufacturers and Contractors of

UNDERGROUND STEAM DISTRIBUTING SYSTEMS
TUNNEL OR CONDUIT CONSTRUCTION



"We solicit your correspondence"

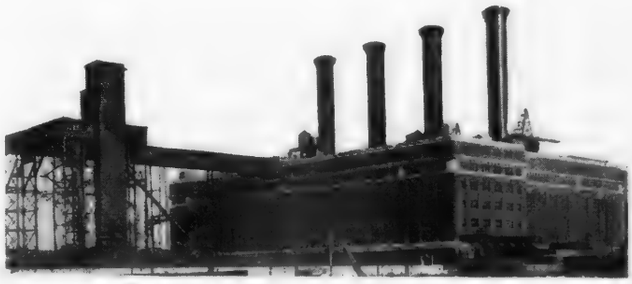
W. H. PEARCE & CO.

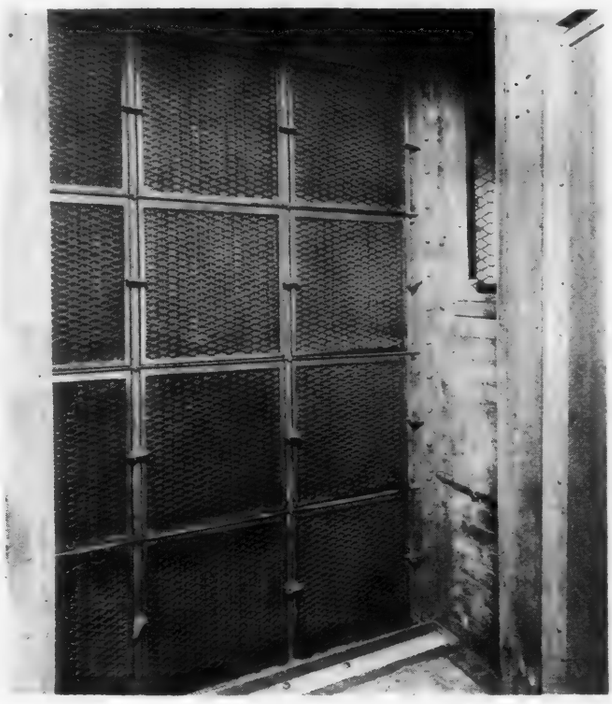
115 S. Dearborn Street
CHICAGO

Catalog on Request

An installation of Tangldust Air Filters in the Hell Gate Station of the United Electric Light and Power Company, New York, N. Y.

THOMAS E. MURRAY, Inc., Engineers.

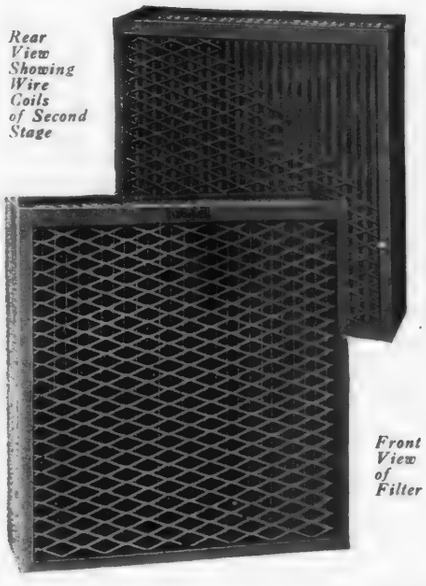




Clean Air for Power Plants

Clean air for power and industrial plants is as essential as for general ventilation purposes. Destructive dirt and dust injure expensive equipment, retard production and menace the health and comfort of workers.

Tangldust Air Filters, with their exclusive two-stage type of construction and renewable oil pad at the top of each filter cell, are proving to be the most efficient and economical type of air filter for general and electrical ventilation, dust recovering, drying operations and bacteria control.

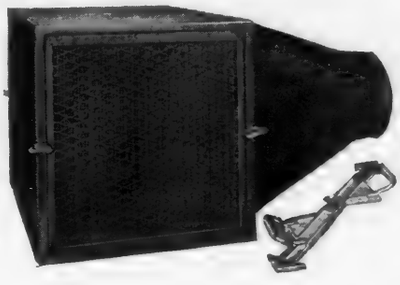


Rear View Showing Wire Coils of Second Stage

Front View of Filter

Type D Tangldust Air Filter for Internal Combustion Engines and Air Compressors

For removing dirt, dust and grit from the air intakes of internal combustion engines and air compressors, we furnish the Type D Tangldust Air Filter pictured at the right. Built to take two, three, or four filter cells as required.



Send for Your Copy of New Catalog

A new catalog, just off the press, pictures the improved construction of the Tangldust Air Filter, describes how it operates and shows illustrations of filters installed in public buildings and industrial plants.

TANG L DUST TRADE MARK REGISTERED **AIR FILTERS**

MADE BY THE COOLING TOWER COMPANY, INC.- 15 JOHN STREET, NEW YORK

Temperature of Each Room Controlled by Mouat System of Heating

Let us send full details

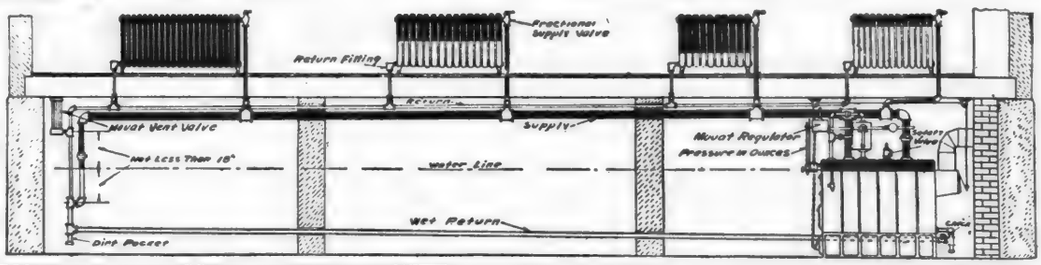
The primary object of the Mouat System is to permit a positive hand control of the heat at each radiator, making it possible to regulate the temperature in each room.

This is accomplished by partially opening or closing the radiator supply valves, allowing only a portion of any radiator to become heated. Any radiator may be turned on fully or closed off completely.

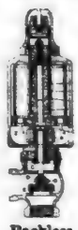
Shaded portions of the radiators in the diagram below show how the heat in the radiators can be graduated or controlled as desired.

MOUAT VAPOR HEATING COMPANY
CLEVELAND, OHIO

Showing how the Heat can be Graduated or Controlled



AUTOMATIC
HEAT REGULATION
ELECTRICALLY OPERATED



Packless Electric Valve

Whether it be for an isolated room or complete building, Gold's Control will give you that desired equable temperature. Energy derived from the 110 volt lighting current.

Write for General Catalog with Testimonials

Thermostat

GOLD CAR HEATING & LIGHTING CO.
BUSH TERMINAL
220 36th STREET BROOKLYN, N. Y.

CENTRAL STATION STEAM CO.
2912 East Woodbridge St.
DETROIT, MICHIGAN

MANUFACTURERS OF
Cadillac Condensation Meters
Detroit Feed Water Meters

Packingless Expansion Joints and other special fittings for underground steam distribution mains.

Service *The* *Satisfaction*

VECO SYSTEM of VAPOR HEATING

Is the result of 21 Years of Specialization in Vapor Heating
ounces pressure — modulation — perfect regulation.

VAPOR ENGINEERING COMPANY

PHILADELPHIA—10 So. 18th Street
J. Wilbur Glassey—M. S. Buck

NEW YORK—489 Fifth Avenue
Chas. E. Scott—R. C. Willis

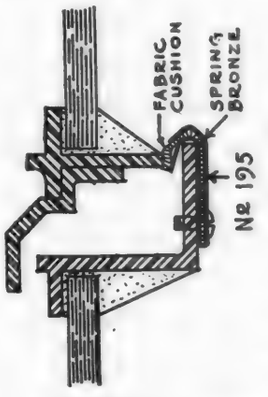
Athey

(*Patented*)

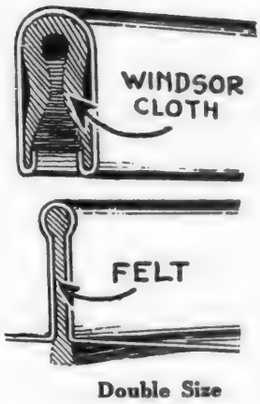
Cloth-Lined Metal Weatherstrip

The weatherstrip that makes a perfect seal for both wood and metal sash

Athey is the **only cloth-lined** metal weatherstrip made. And experience, as well as scientific tests, prove that a cloth-to-metal contact is the only one that provides a perfect "seal" against drafts and dusts, without making the windows almost impossible to open and close.



Athey Cloth-Lined Metal Weatherstrip for drawn steel windows. Notice the cloth and spring bronze contact. This strip is recommended by leading manufacturers of steel sash as the one practical and efficient weatherstrip made.



Double Size

Athey Cloth-Lined Metal Weatherstrip for wood sash. The cloth-to-metal contact keeps out all drafts, dust and noise, yet is sufficiently pliable so the windows can be opened easily.

It can be used on either wood or metal sash. Leading manufacturers of steel sash (both drawn and hollow) recommend it as the best obtainable for use with their product.

Keeps out drafts and soot cuts coal and cleaning bills

The elimination of drafts has a direct bearing on coal bills. Hence is of utmost importance to every heating engineer. Figures taken from many Athey installations show that the use of Athey Strip reduces the amount of coal sufficiently to **pay the entire cost within a year or two.**

Write for complete information and prices

Athey Products

SEE OUR CATALOGUE IN SWEETS

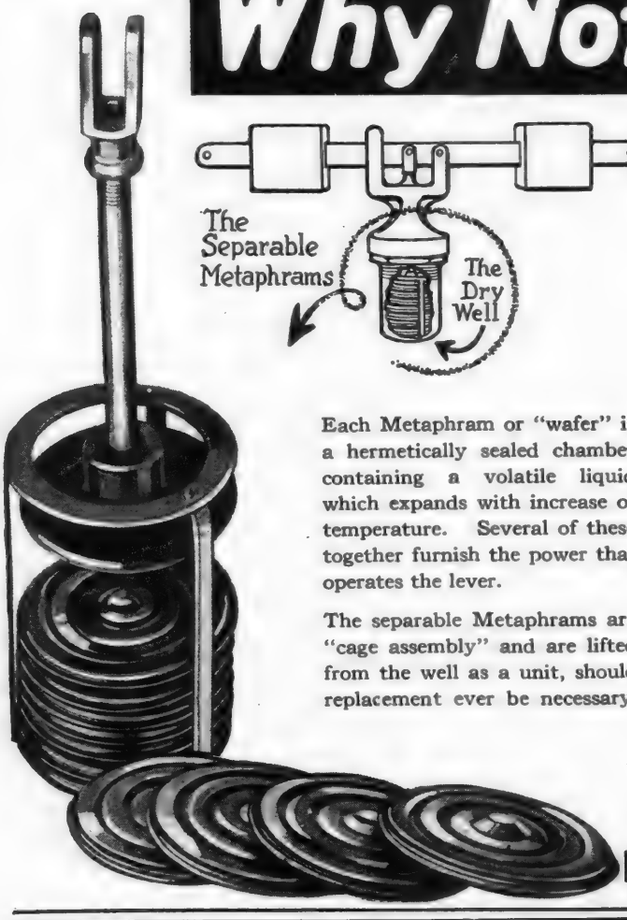
Perennial Window Shades Disappearing Partitions
Skylight Shades Cloth-Lined Metal Weatherstrips

Athey Company

6047 West 65th Street - Chicago, Illinois

In Canada: **CRESSWELL-McINTOSH, Reg'd.**
270 Seigneurs St., Montreal, Que.

Why Not Hot Water?



Each Metaphram or "wafer" is a hermetically sealed chamber containing a volatile liquid which expands with increase of temperature. Several of these together furnish the power that operates the lever.

The separable Metaphrams are "cage assembly" and are lifted from the well as a unit, should replacement ever be necessary.

A regulator is standard trimming on a steam boiler. Why not on hot water?

A steam installation would not be complete without a regulator. Everyone knows that.

Then why should you omit it on a hot water job? It's just as important for economical operation.

You can make hot water installations more profitable, more efficient and more satisfactory by adding a

METAPHRAM DAMPER REGULATOR

There is a fertile field for you, selling and installing this sensitive but positive, much needed regulator—on new or old installations.

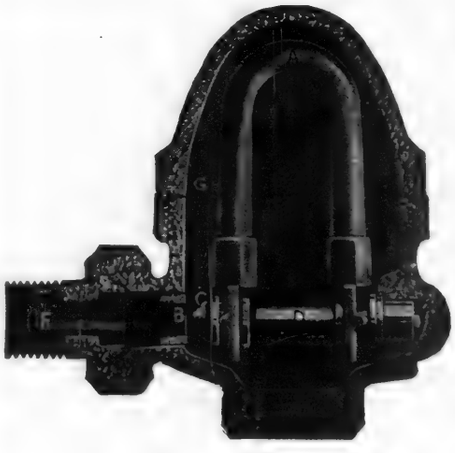
Order from your jobber or direct.

Write for circular.

NATIONAL REGULATOR CO.
2301 KNOX AVENUE CHICAGO

European Office: A. J. Assheton, 18 St. Thomas St., London, S.E.1, Eng.

The Perfect Automatic Valve for Vacuum or Vapor Heating



"VENTO" Advantages

System starts with valve wide open, assuring circulation almost the instant steam is turned on.

Control of valve opening from two to eight times larger than other makes of valves.

Size of valve opening reduces danger of fouling with scale or other foreign matter.

Closes absolutely tight against steam. No necessity for use of spray water at pump.

Cannot stick or gum from foreign matter, and operation is absolutely noiseless.

The "Vento" Automatic Valve represents a steady improvement in the Haines line of steam traps and offers the highest degree of steam trap efficiency.

There has been no change in the old reliable principle that has placed Haines Automatic Valve in a class by itself. The operating power is identical—the only difference being in the general construction.

Special features are: Horizontal mounting of valve mechanism—long range of movement—positive action—quick opening and closing.

Send for booklet

WILLIAM S. HAINES & CO.
12th & Buttonwood Streets
PHILADELPHIA, - - PA.

VENTO

Cork Lined Houses Make Comfortable Homes

Residence of Mr. J. A. Cameron, 516 Madison Avenue Birmingham, Michigan—one of the hundreds of homes being heated more easily and economically because they are insulated with Armstrong's Corkboard.

Armstrong's Corkboard is made of pure cork in boards 12 inches by 32 or 36 inches —from 1 inch to 3 inches thick.

Reg. U. S. Pat. Off

You Can Figure a Smaller Plant in the Cork-Lined House

NOT only can you count more surely on effective, economical heating when you put your plant in a cork-lined house, but you can safely figure a *smaller* plant.

Here is the reason: About 55% of the heat loss from an uninsulated house is through the walls and roof. A lining of Armstrong's Corkboard reduces that loss by fully 60%—a net saving of 33%. A third less heat wasted means a third less heat needed.

The smaller plant will not only heat the cork-lined house thoroughly and comfortably, but it will heat it more uniformly and with much less fuel. In other words, you can give your client a better job at a lower cost, and there is no more solid foundation than that for building a bigger and more profitable business.

Cork lining for houses is here to stay. It means changing your methods of estimating, but all to your advantage. You should be fully informed as to how Armstrong's Corkboard effects the transmission of heat through building walls and roofs. This information will be supplied on request. Address

ARMSTRONG CORK & INSULATION COMPANY
(Division of Armstrong Cork Company)
202 Twenty-fourth Street, Pittsburgh, Pa. McGill Bldg., Montreal, Que.
Armstrong Cork Company, Ltd., Sardinia House, Kingsway, London, W. C. 2, England

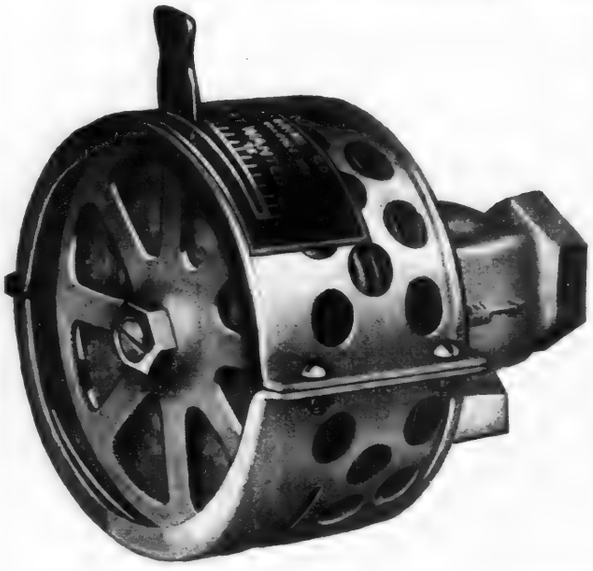
Branches in the Principal Cities of the United States

Armstrong's Corkboard Insulation

A Heatproof Lining for Walls and Roofs

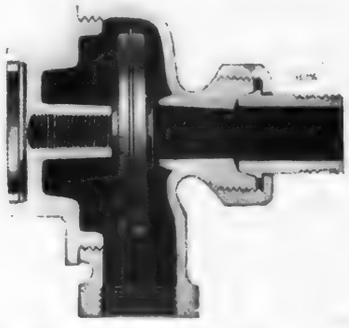
Sterlco
TRADE MARK

Comfort and Efficiency



The combination of the Sterlco-Thermotrol governing the admission of steam and the Sterlco Thermostatic trap preventing the waste of steam insures comfortable temperature and high radiator efficiency.

Write for Bulletins 36 and 38



STERLING ENGINEERING COMPANY

1626-1644 Holton Street, MILWAUKEE, WIS.

REPRESENTATIVES IN ALL LARGE CITIES

YEOMANS

YEOMANS PUMPS · GIVE YEOMAN SERVICE ·

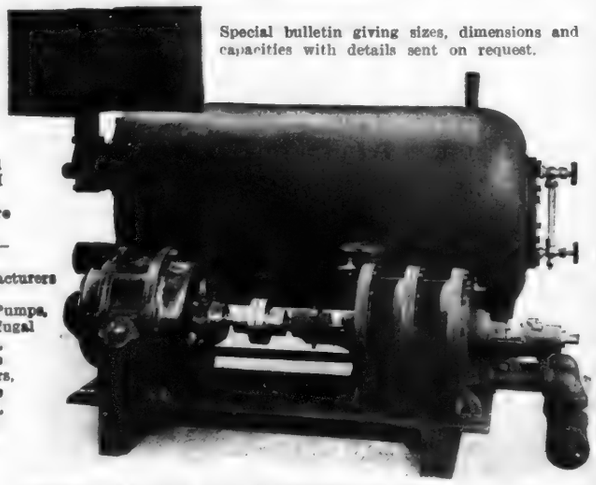
CONDENSATION PUMPS

The mark of Dependability

AUTOMATIC
ELECTRIC
NOISELESS
RUGGED

Built for all pressure and capacity requirements

Special bulletin giving sizes, dimensions and capacities with details sent on request.



Special Type H High Pressure Unit.

Also manufacturers of Bilge Pumps, Centrifugal Pumps, Sewage Ejectors, Sewage Pumps, etc.

YEOMANS BROTHERS CO.

1421 Dayton St. Representatives in all principal cities. Chicago, Ill.

DEPENDABILITY

Heating and Ventilation
STANDARD DATA SHEETS

SOME SUBJECTS

B. T. U. Losses	Flow of Steam in Pipes
Ducts and Flues	One Pipe Steam Systems
Chimneys	Vacuum Heating Systems
Fittings	Vapor Heating Systems
Pipe Covering	Gravity Water Heating

326 Sheets Covering 28 Important Subjects

Price 5 Cents per Sheet

Send for folder giving full list and special prices on sets and folder

Price for Entire Set, with Binder, $14.00

HEATING AND VENTILATING MAGAZINE CO.

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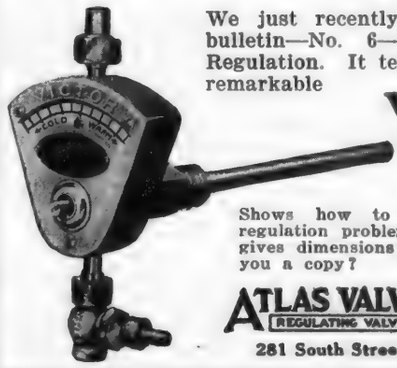


We just recently printed a new bulletin—No. 6—on Temperature Regulation. It tells all about this remarkable

VICTOR
Temperature Regulator

Shows how to solve temperature regulation problems; how to install; gives dimensions; tables; etc. Have you a copy?

ATLAS VALVE COMPANY
REGULATING VALVES FOR EVERY SERVICE

281 South Street, Newark, N. J.

A man may be known by the company he keeps

—but a burner is known by the companies that use it

A man generally seeks a level in society where his character and accomplishments best fit in, and then chooses his company.

BARBER Patented JET GAS BURNERS

are not made merely to fit in just where they might meet certain demands. They are carefully and scientifically designed to reach the highest plane in water heating requirements.

We know no stronger proof of our claims than the standardization of Barber Burners for the entire line of American Radiator Company's ARCO TANKS for Hot Water Supply.

American Radiator Quality speaks for itself, and an accessory chosen to maintain that reputation, as well as the standards of other prominent heater manufacturers, is justified in claiming and sharing the popularity of the heaters of which it is so important a component part. In other words . . ."A burner is known by the companies that keep 'using' it."

Let us send full information, engineering data, prices and discounts.

Among the many Heater Manufacturers who have adopted and are using "Barber Patented Jet Gas Burners" are the following:

American Radiator Company
Barton-Roth Co.
Bastian-Morley Co. (Crane)
Bryan Steam Corporation
Coast Heater Mfg. Co.
Day & Night Water Heater Co.
Franklin Plumbing Supply Co.
Geneva Heater Co.
Gewert Mfg. Co.
Hoffman Heater Co.
Hotstream Heater Co.
Edw. Katzinger Co.
Lovekin Water Heater Co.
The New Way Mfg. Co., Inc.
Piatt Water Htr. Co.
Sands Manufacturing Co.
Snap-O-Stat Co.
Southard Robertson Co.
Superbo Water Heater Co.
Superbo Mfg. Co.
Welsbach Company
Walter Mork Heater Co.

Barber Burners reduce gas bills; act as their own pilot light; can be controlled by any good thermostat, develop 1960 degrees Fahr. with 500 B. T. U. gas; do not corrode; will not back-fire; or develop carbon; require no adjustment or service; and made for manufactured, natural or mixed gas.

Three sizes of burners shown below, Nos. S-10, S-80, and Z-10, are available for the six sizes of ARCO TANKS for Hot Water Supply, according to size of heater and to kind of gas used.

The CLEVELAND GAS BURNER & APPLIANCE CO.

Burner Specialists

3702-04 Superior Avenue, Cleveland, Ohio

No. 202 Hot Water Radiator Valve Angle Pattern with Union

Free from Sticking

OUR No. 202 Hot Water Radiator Valve was developed in response to the demand for a valve which would not stick. It is so designed that the half-turn of the handle, which opens or closes the valve, also pushes the shell up or down, making sticking impossible.

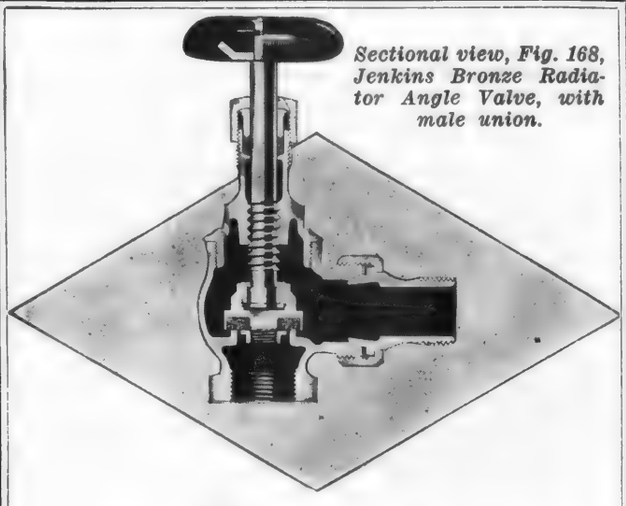
The operating parts are all made of brass rod and castings, the shell and stem being cast in one piece. The packing consists of an asbestos ring having a metal insert.

Additional strength has been secured at an important point by the use of a forged tail nut, instead of the usual casting, thus eliminating the trouble so frequently caused by the old style nut cracking and breaking.

This is a patented valve which we confidently recommend as being satisfactory in every respect. Your jobber can supply you.

Commonwealth Brass Corporation
DETROIT

COMMONWEALTH
LAVIGNE
Radiator Valves



Sectional view, Fig. 168, Jenkins Bronze Radiator Angle Valve, with male union.

—as if *your* name were on each valve

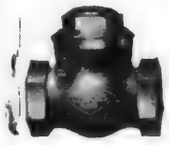


Fig. 352, screwed, Jenkins Standard Bronze Swing Check Valve.

Fig. 110, screwed, Jenkins Standard Bronze Cross Valve.

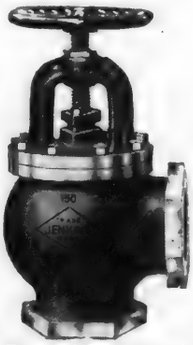


Fig. 143, screwed, Jenkins Standard Iron Body Angle Valve.

In the opinion of many of your customers, the responsibility for valve performance rests on you as definitely as if your name were on each valve.

Since this is the case, let yourself be represented by valves made for the maximum service, not merely the average. Let **your** valves be Jenkins Valves.

The Jenkins "Diamond" stands for valves with the reserve strength to resist pipe strains—valves well made from the best metals, and tested to allow a wide margin of safety.

JENKINS BROS.

80 White Street.....New York, N. Y.
524 Atlantic Avenue.....Boston, Mass.
133 No. Seventh St....Philadelphia, Pa.
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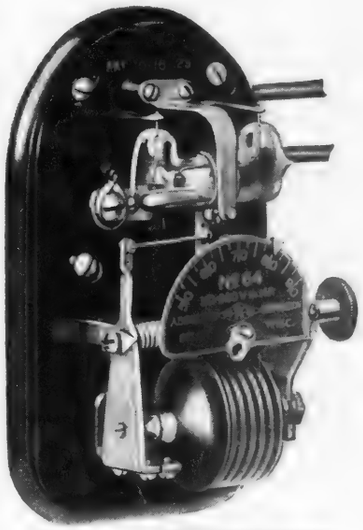
JENKINS BROS. LIMITED

Montreal, Canada.....London, England

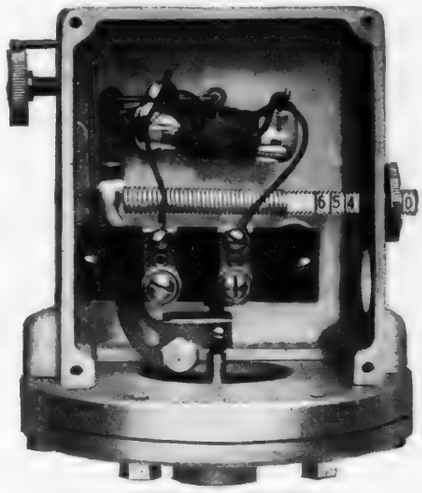
Always marked with the "Diamond"
Jenkins Valves
SINCE 1864



No. 64. THERMOSWITCH.

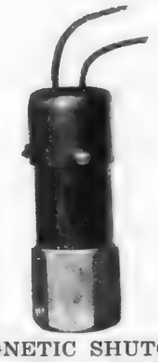
CON-TAC-TOR

High Voltage
Oil Burner
Controls
Simple—Safe
Dependable



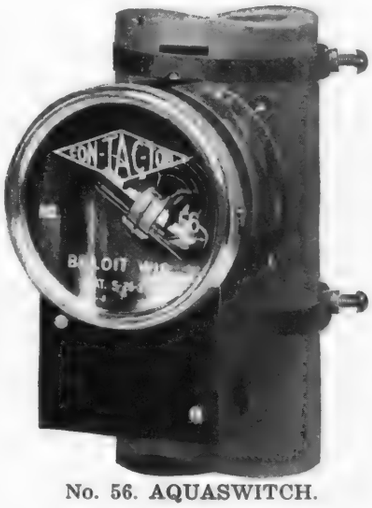
No. 33. PRESSURESWITCH.
No. 42. VAPORSWITCH.

A Full Line of
Automatic
Controls
for any type
of Oil Burner
Thermal Safety



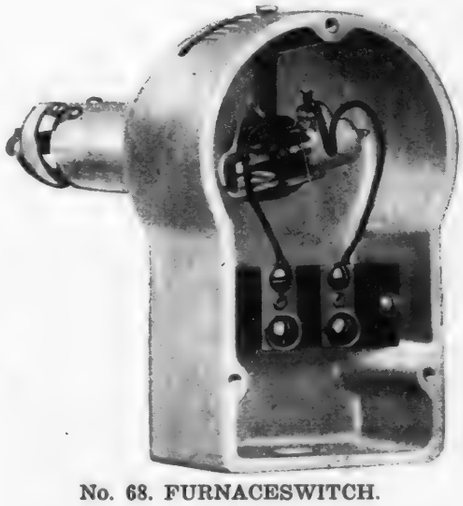
MAGNETIC SHUTOFF
OIL AND GAS VALVE.

Automatic
Controls
for Forced Draft
Coal Fired
Installations
Easy to Install
and Adjust



No. 56. AQUASWITCH.

Blower Controls
for
Unit Heating
Systems
Simple Wiring
Direct to Motor
No Relays



No. 68. FURNACESWITCH.

ABSOLUTE CON-TAC-TOR CORPORATION

BELOIT, WISCONSIN

St. Louis, Mo., is justly proud of its new Coliseum Pool, built by the Natatorium Construction Co. of New York

In the Sparkling Green Waters of a "National"---Warmed Pool

How invigorating a swim with the water "just right"! The thousands who play in the Coliseum pool are regular visitors for they are always sure to find the temperature of the water to their liking.

National Heaters are giving excellent service in Schools, Hotels, Clubs, Apartment Houses, Colleges, Gymnasiums, Y.M.C.A's, Office and Municipal Buildings.

The responsibility of maintaining the temperature evenly in this pool (and many others) is rested in National Instantaneous Heaters designed specially for swimming pool service. Like all National heating units, once installed they are absolutely reliable and go on functioning with no further thought or care.

NATIONAL
U BEND TYPE
Instantaneous HEATERS

National gives in design, construction and materials all that can be desired. The absorbing element in the heater is pure copper seamless drawn tubes expanded into forged steel tube plates. The entire element is easily removed as a unit. Shells are of steel or cast iron.

National Instantaneous Heaters will efficiently heat the water as it flows into the pool or will reheat the pool water to maintain it at a given temperature.

We recommend the National for your next pool. You will get an individually engineered installation that will deliver all and more than the specifications call for.

National Heaters are the product of the oldest and most progressive organization in the field, with 43 years of engineering experience behind it. We invite your inquiries and will be pleased to send our engineers to consult with you. Write for Bulletin No. 56.

THE NATIONAL PIPE BENDING CO.
Established 1883
120 River St., New Haven, Conn.
Boston New York Philadelphia

The Standard Heater for Swimming Pool Service

Compensating Balance

BREGUET Hair Spring

Adjusted to Isochronism

and the finish of a high grade watch

Minneapolis Model 77 Clock---Built Throughout for Dependable Service

Compensating balance—Breguet hair springs—heavier plates—highly polished pinions and pivots—every essential bearing jewelled—every unit of this same high order. The finished workmanship and the best quality materials throughout—

This explains why the Minneapolis Model 77, 7-jewel, 8-day clock has proved such an outstanding success. It is built absolutely right in every detail—a fact that is even more important than the 7-jewel escapement. For jewels alone cannot make a dependable, high-grade timepiece.

Never has there been a clock so well adapted for use with heat control equipment. This Model 77 clock is built like a fine watch. It is absolutely accurate and dependable.

The Minneapolis clock is made completely in the Minneapolis clock factory. With the new, simplified Model 77 Thermostat and new, improved electric motor, it forms the perfect automatic heat control device and makes Minneapolis leadership greater than ever.

Write today for Minneapolis catalog illustrating and fully describing Model 77 with the superior 7-jewel, 8-day clock.

Minneapolis Heat Regulator Co.

Established 1885

2804 Fourth Ave., So. Minneapolis, Minn.

The "MINNEAPOLIS" HEAT REGULATOR
for COAL—GAS—OIL

Wrigley Building

Chewing Gum and Patterson Hot Water Heaters

Wm. Wrigley Jr. Co. are probably the largest manufacturers in their line, not only because of their ability to select the best raw materials as well as employees who know how to make good gum, but also their ability to choose men who know dependable, efficient materials and equipment.

In selecting Patterson Hot Water Heaters for this magnificent, costly building, their architects and engineers had the 45-year record of the "Patterson" to back their judgment. They were not gambling.

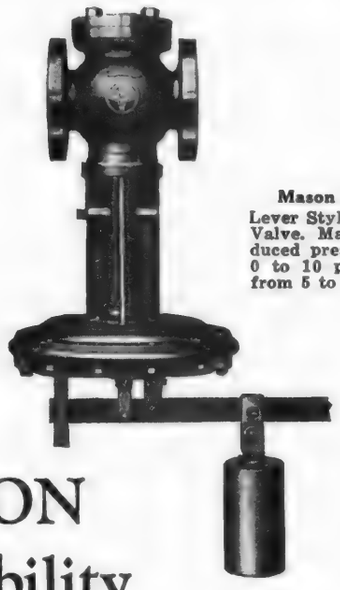
Furthermore, they knew that if these heaters did not deliver all the hot water needed, as hot as desired, that they could rely upon us to make good their promise.

When you specify "Patterson" Hot Water Heaters you can be sure of no "come back."

Our Catalog is yours for the asking.

The Patterson-Kelley Co.

107 East 40th St., New York



Mason No. 236
Lever Style Reducing Valve. Made for reduced pressure from 0 to 10 pounds and from 5 to 25 pounds.

MASON Reliability *in a* Low Pressure Reducing Valve

The Mason Lever Style Reducing Valve is designed for accurate regulation of steam in heating systems.

It is balanced and operates with a minimum amount of power irrespective of the initial pressure. Friction of moving parts is reduced to a minimum by the elimination of stuffing boxes and the suspension of the weighted lever on hardened steel knife edges.

The Mason Lever Style Reducing Valve is worthy of the Mason reputation for lasting accuracy in service. Ask your supply dealer for Mason and look for the Mason trademark on every valve.

May we send you our Catalog 62? It contains useful information.

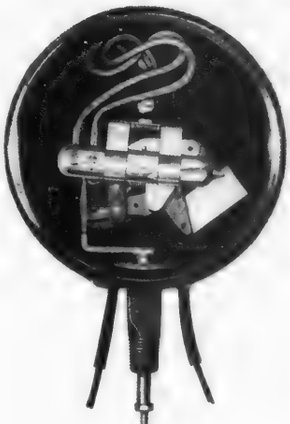
Mason Regulators

MASON REGULATOR CO.
Boston, Mass.

8991

See the Complete Line of Federal Mercoids—

At Booth 36—April 6, 7, 8.
Book Cadillac Hotel—Detroit



Federal Mercoid Float Switch

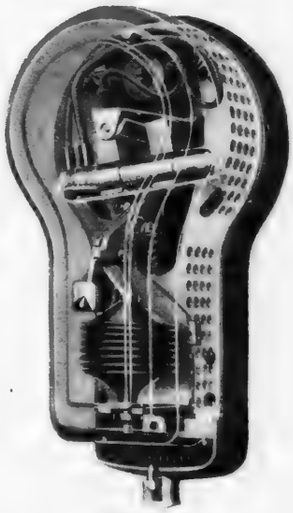
The completion of the new Type "S" Safety Switch for flue installation allows the Federal Gauge Company to show a most complete line of controls at the Oil-Burner Convention at Detroit.

Leading oil-burner manufacturers, who realize that dependability of action is of the greatest importance in the operation of their burners, have standardized on the Federal Mercoid System.

They know that years of service do not affect the power and sensitiveness of Mercoid Controls.

Reputable burners and future sales are assured when you can say "Mercoid Equipped."

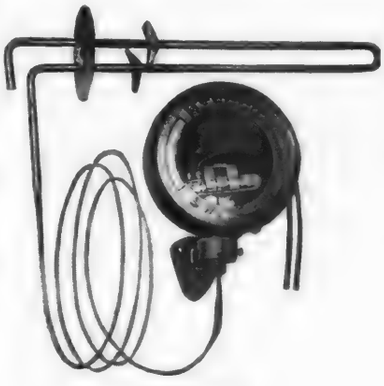
Our engineers are at your service. Write for Bulletin E-2 and Bulletin 848.



Mercoid Thermostat

Mercoid Pressure Steam Boiler Control

Mercoid Remote Stem Control For Hot Water Boilers



Mercoid Furnace Control

The Federal Gauge Company

564 WEST ADAMS STREET, CHICAGO, ILLINOIS

NEW YORK OFFICE: 25 CHURCH STREET

Scott Bronze Gate Valves

No. 0	—S.E. Solid Wedge—Non-rising Stem	125 lbs. S.W.P.
No. 1	—S.E. Split Wedge—Non-rising Stem	125 lbs. S.W.P.
No. 2	—F.E. Split Wedge—Non-rising Stem	125 lbs. S.W.P.
No. 8	—S.E. Hose Gate—Non-rising Stem	125 lbs. S.W.P.
No. 22	—S.E. Quick Opening Gate—	125 lbs. S.W.P.
No. 23	—F.E. Quick Opening Gate—	125 lbs. S.W.P.
No. 170	—S.E. Solid Wedge—Non-rising Stem	150 lbs. S.W.P.
No. 171	—F.E. Solid Wedge—Non-rising Stem	125 lbs. S.W.P.
No. 172	—S.E. Solid Wedge—Non-rising Stem	175 lbs. S.W.P.
No. 173	—F.E. Solid Wedge—Non-rising Stem	175 lbs. S.W.P.
No. 41	—S.E. Solid Wedge—Non-rising Stem	250 lbs. S.W.P.
No. 42	—F.E. Solid Wedge—Non-rising Stem	250 lbs. S.W.P.
No. 1-A	—S.E. Solid Wedge—O.S.&Y.	150 lbs. S.W.P.
No. 172-A	—S.E. Solid Wedge—O.S.&Y.	175 lbs. S.W.P.
No. 41-A	—S.E. Solid Wedge—O.S.&Y.	250 lbs. S.W.P.

Scott Iron Body Gate Valves

No. 35	F.E. Inside Screw—Single Disc	40 lbs. S.W.P.
No. 35-A	—F.E. O.S.&Y.—Single Disc	40 lbs. S.W.P.
No. 300	—F.E. Inside Screw—Solid Wedge	100 lbs. S.W.P.
No. 301	—S.E. Inside Screw—Solid Wedge	100 lbs. S.W.P.
No. 431	—S.E. Inside Screw—Split Wedge	125 lbs. S.W.P.
No. 432	—F.E. Inside Screw—Split Wedge	125 lbs. S.W.P.
No. 433	—S E. O.S.&Y.—Split Wedge	125 lbs. S.W.P.
No. 434	—F.E. O.S.&Y.—Split Wedge	125 lbs. S.W.P.
No. 637	—S.E. Inside Screw—Solid Wedge	175 lbs. S.W.P.
No. 638	—F.E. Inside Screw—Solid Wedge	175 lbs. S.W.P.
No. 639	—S.E. O.S.&Y.—Solid Wedge	175 lbs. S.W.P.
No. 640	—F.E. O.S.&Y.—Solid Wedge	175 lbs. S.W.P.
No. 843	—S.E. Inside Screw—Solid Wedge	250 lbs. S.W.P.
No. 844	—F.E. Inside Screw—Solid Wedge	250 lbs. S.W.P.
No. 845	—S.E. O.S.&Y.—Solid Wedge	250 lbs. S.W.P.
No. 846	—F.E. O.S.&Y.—Solid Wedge	250 lbs. S.W.P.
No. 847	—S.E. O.S.&Y.—With By-pass	250 lbs. S.W.P.
No. 848	—F.E. O.S.&Y.—With By-pass	250 lbs. S.W.P.

There's a Scott Valve
For Every Job You Have

The Scott Line is Practically Complete

For your convenience in ordering by figure number, we list herewith and in succeeding advertisements Scott Valves for every service.

Scott Gate Valves are full weight, rugged in construction, and are made of the highest grade bronze or iron. They have an enviable record over a period of 40 years for dependable and efficient service.

SCOTT VALVE MANUFACTURING COMPANY, 3962 McKINLEY AVENUE DETROIT MICHIGAN

Manufacturers of the Complete Line of

SCOTT VALVES

SINCE 1886 SIGN OF VALUE

"MAXIMUM SERVICE PER DOLLAR"

No. 1 Pressure Regulator—Piston Type

Made in sizes ⅜ to 14 in. inclusive—Std. and Ex. Hvy.
Sizes 1½ in. and under made with bronze bodies—screwed ends only.
Sizes 2 to 6 in. inclusive made with iron bodies—screwed or flanged ends.
Sizes 7 in. and above made with iron bodies—flanged ends only.

KLIPFEL
PRESSURE REGULATORS

Automatically reduce any initial steam, air or water pressure to any desired reduced pressure above 2 lbs.

Maintain reduced pressure constantly regardless of fluctuations in boiler pressure, or changes in the demand for steam.

Simple, rugged and direct acting. As low pressure builds-up and exerts pressure under piston, a balance is formed between low pressure and weighting, which in turn regulates the inner valve opening.

Visible in action. Lever may be used to open, close or test by hand. Position of inner valve may be easily judged by looking at the lever.

Bronze cylinder, multiple grooved piston and balanced plunger type bronze inner valve. All working parts removable while valve body remains in the pipe line.

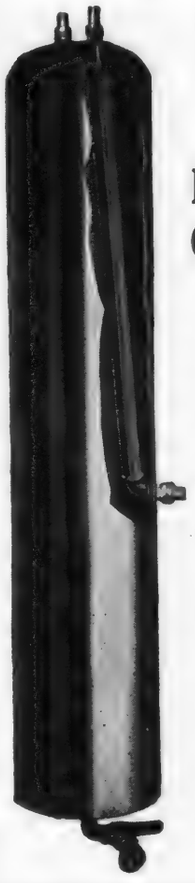
No troublesome springs, toggles, packing boxes or pilot valves. Dashpot included, which insures steady service pressure and overcomes any tendency of valve to chatter or vibrate.

Guaranteed to closely regulate at maximum steam loads, as the capacity—size for size—is equal to or greater than that of any competing pressure regulator.

We Invite Correspondence.

KLIPFEL MFG. CO., 2641-59 W. Harrison St. CHICAGO, ILL.

Manufacturers of a Complete Line of Steam Specialties including Expanded Outlet Pressure Regulators (Both Piston and Diaphragm Types)—Float Valves—Pump Governors—Back Pressure Valves—Relief Valves—Grease Traps—Steam Traps and many other Specialties.
Sold by Leading Jobbers in all Principal Cities—Write for Catalog No. 20.



Hot Water—No Waiting

WITH

DAHLQUIST AQUATHERM COPPER RANGE BOILER

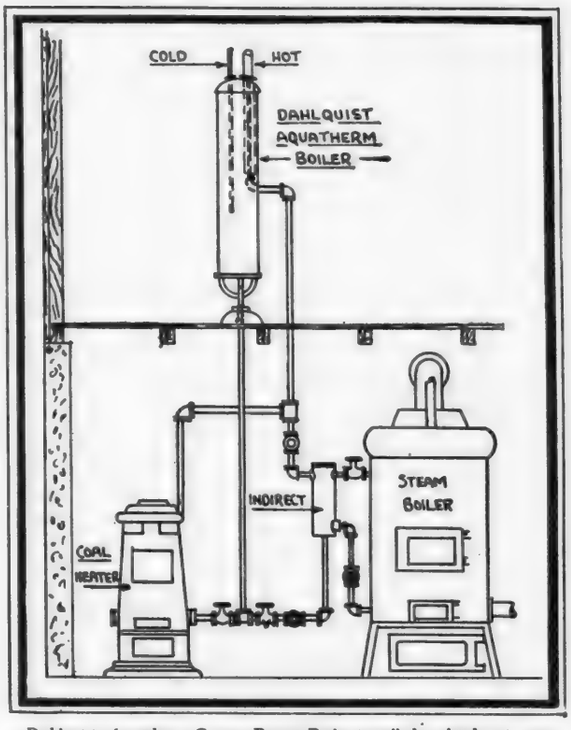
With a reduction of one-half the cost of installing a gas tank heater on any job, you can have the convenience of an instantaneous heater, either from the ordinary gas tank heater, water back in coal range, indirect heater or coil in boiler or furnace, or electric heater, by installing the **Dahlquist Aquatherm Copper Range Boiler.**

The **Dahlquist Aquatherm** can also be furnished separately in proper size for any range boiler now installed, whether heated by gas, coal, wood or electricity.

Let us send full details

DAHLQUIST MFG. CO.

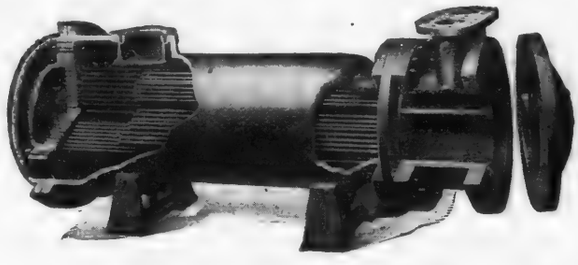
40 W. 3rd St. BOSTON, MASS.



Dahlquist Aquatherm Copper Range Boiler installed in kitchen in connection with indirect water heater and coal fired water heater in cellar.

Hot Water *Instantly*

Any quantity, any temperature



For Hotels, Apartments, Laundries, etc.

G-R Instantaneous Heater

for any given pressure drop, has a higher rate of heat transfer than any other closed water heater on the market.

Overload capacities possible with only slight reduction in final water temperature.

Minimum external dimensions for any desired rating.

The Griscom-Russell Co.

Dept. H, 285 Madison Ave., New York

Philadelphia	Chicago	St. Louis	San Francisco
Boston	Detroit	New Orleans	Los Angeles
Rochester	Ceveland	Dallas	Seattle
Pittsburgh	Milwaukee	Houston	Salt Lake City
Columbus	Minneapolis	Atlanta	Tulsa
Indianapolis	Kansas City	Charlotte	Denver

For Canada: Riley Engineering and Supply Co., Ltd., Toronto

Send the coupon for full information

THE GRISCOM-RUSSELL CO., Dept. H, 285 Madison Ave., New York City.

Gentlemen:—

Please forward immediately a free copy of your information leaflet on the G. R. Instantaneous Heater.

Name .....

Firm .....

Address .....

H&V 4-26

Adjustable Steel Hook Plates

THE FRANK

LINE OF RADIATOR BRACKETS

Single Wall Radiator Bracket

To know what is required of a radiator bracket, as well as any other product, is to thoroughly know the industry which it is to serve.

Long experience as a steamfitter has given Mr. John C. Frank a thorough knowledge of radiator bracket requirements. As a result of this experience the Frank Radiator Company offers a line of brackets assuring safety, economy and convenience. Their design and construction have been carefully thought out, and many features are embodied which make each type of bracket particularly adaptable to the duty for which it is designed.

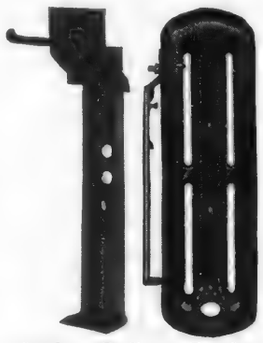
Adjustable Steel Insert

An outstanding advantage is the one bolt feature, saving from twelve cents up on each bracket plus cost of drilling and inserting extra bolts.

Complete line described in our catalog. Send for one.

Ceiling Hanger

THE FRANK RADIATOR BRACKET CO.
30 No. LaSalle St.
Chicago



Legless Radiator Bracket

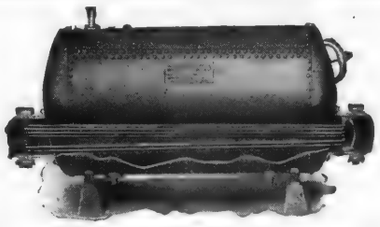
CORRECTLY DESIGNED

Cast Iron Blow Off Basins

also

APPROVED GARAGE BASIN EQUIPMENT

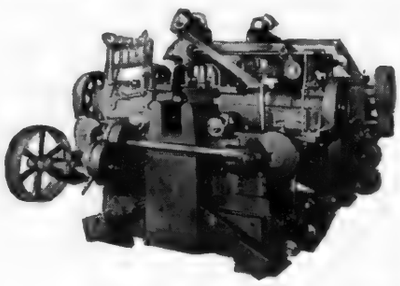
INLAND IRON WORKS
99-111 McDonough Street JOLIET, ILL.



Alberger-Buffalo Storage Heaters have tubes the full length of tank which insures maximum heat transfer. Satisfaction guaranteed. Write for information on Alberger Multi Head Heaters and Howard Guided Expansion Joints.

ALBERGER HEATER COMPANY
HOWARD IRON WORKS
281-289 Chicago St. Buffalo, N. Y.

BRYANT RADIATOR MACHINERY

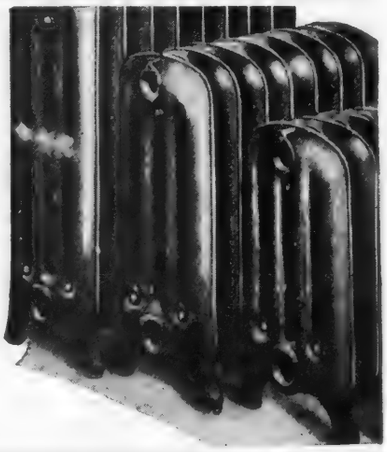


Four Spindle Horizontal Radiator Boring Machine Bores 240 Loops per hour.

This machine may also be had with automatic conveyor by which the above production may be *doubled*.

This Bryant Radiator Boring Machine completes all the boring on a radiator loop in every cycle of the machine. One operator tends the machine—he has but to place the work and touch a lever to clamp. Unclamping is automatic and loop must simply be removed. Machine is fully adjustable for holes from 8" to 45" center to center and 4" to 14" in width.

We are makers also of a full line of radiator and nipple assembling, tapping, boring, facing, drilling and testing machines, automatic and semi-automatic. Consult with us.



Third generation of Bryant's making Radiator Machinery

O. Bryant Sons & Company, 366 Ontario St., Buffalo, N. Y.

The WAINWRIGHT
Low Pressure Expansion Joint

Wainwright low pressure or turbine expansion joint.

FOR low pressures this light weight copper expansion joint provides the most simple and inexpensive means for compensating for pipe expansion. Multiple corrugations make it more flexible and longer lived than the "coppersmith" type of joint with a single corrugation. The Wainwright Joint is absolutely steam or liquid tight, there is no packing to be replaced, and it requires no attention. For use in water or high velocity steam lines it may be supplied with an internal protecting sleeve to prevent erosion of the copper expansion member and to reduce friction.

For high pressure service, the Wheeler Condenser & Engineering Co., also manufactures the Wainwright Improved Expansion Joint with Internal and external equalizing rings.

Wainwright anchors and guides form the most efficient means of fastening pipe lines.

WHEELER CONDENSER & ENGINEERING CO.
149 Broadway, New York

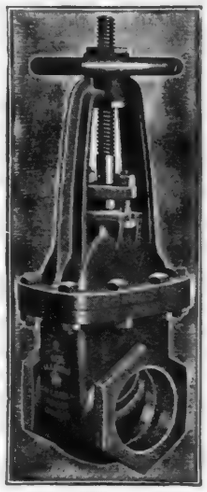
Works - CARTERET, N.J., NEWBURGH, N.Y.

WHEELER PRODUCTS INCLUDE—Condensers—all types, Cooling Towers—Heaters, Steam Jet Air Pumps, Heat Exchangers, Expansion Joints, Evaporators, Centrifugal Pumps, Condenser Tubes, Brass and Copper Pipe.

IRON BODY GATE VALVES

SCREWED, FLANGED
AND
HUB END STYLES

NON-RISING STEM
AND
O. S. and Y. PATTERNS



ALSO MANUFACTURERS OF
Cast and Malleable Iron Fittings

Illinois Malleable Iron Company

1801 Diversey Parkway Chicago, Ill.

Hornung's "Master" Control Valve

CENTRAL STATION & INDUSTRIAL HEATING & LIGHTING JCH

Remote Control of Steam—Air—Water

This motor driven valve control is applicable to many industrial uses, especially where it is desired to control steam, air, or water valves from a remote point—either manual or automatic.

The valve is furnished either single or double seated and for almost any pressure.

The unique gear arrangement protects motor against overloads of any kind.

Ask us for particulars

3367A

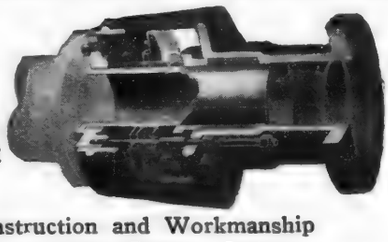
HEAT LOSS IS MONEY LOSS

CENTRAL HEAT APPLIANCES

343 S. Dearborn St. J. C. HORNUNG ENGINEER Chicago, Illinois.

ROSS

Crosshead-GUIDED Expansion Joint Excels in

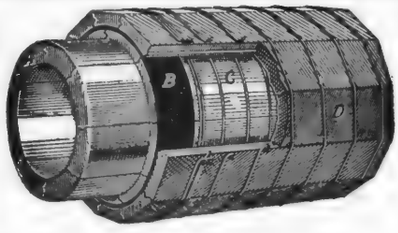


Design, Construction and Workmanship
Over 60% of sales—Repeat Orders
Once Used—Always Demanded
Every Purchaser—A Customer

ROSS HEATER & MFG. CO., INC., BUFFALO, N. Y.

New York, Chicago, Philadelphia, Boston, Cleveland, St. Louis, Detroit, Pittsburgh, Baltimore, San Francisco, Seattle, Denver, Salt Lake City, Omaha, Montreal, Toronto.

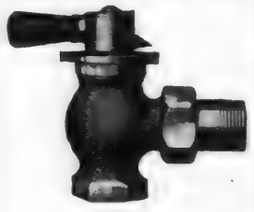
Wyckoff's Improved Cypress Covering



Lasts as Long as The Pipe Itself

As well as being highly efficient in its application, Wyckoff Improved Cypress Steam Pipe Covering withstands all conditions attending steam pipe trenches. All engineers who know Wyckoff Pipe covering specify it because it lasts.

A. WYCKOFF & SON CO. ELMIRA, N. Y.



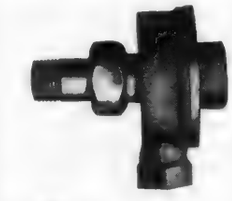
A Dependable Line of Heating Specialties

Stay-Rite Heating Specialties are dependable because they are made right and in strict accordance with heating requirements. They have long since passed the experimental stage. And over many heating seasons they have justified the confidence of their owners and proved the high efficiency of the Stay-Rite Line.

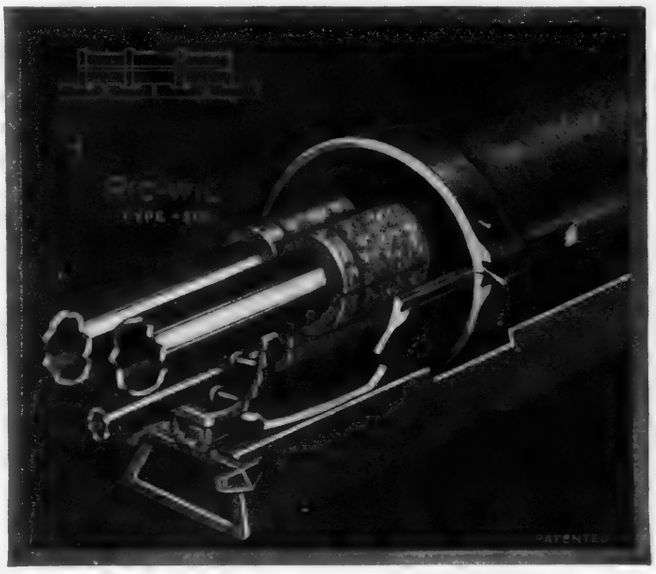
Write for literature and prices

The Ideal Heating Equipment Co.

1250 West 4th Street CLEVELAND, OHIO



Note the other advantages of Ric-wiL Conduit; clog-proof base drain that supports and aligns the conduit; shock-absorbing pipe supports that wedge quickly into place; compact interlocking construction throughout. And these provide unusual economy of installation.



It's the Loc-liP Joint that makes Ric-wiL Underground Conduit the system of outstanding efficiency. For this joint seals the conduit against moisture and locks the cement seal in place. It guarantees permanently dry insulation and dry insulation means high efficiency. You are absolutely sure with Ric-wiL and the Loc-liP joint.

7 Efficiencies of the Loc-LiP Joint

1. It is water-tight.
Joints between top and bottom halves of conduit not merely fastened with cement, but are completely sealed with it, plenty of it. A joint that water cannot penetrate.

2. Has Unusual Strength.
The Loc-liP joint restores the split tile, when installed, to a strength even greater than before splitting. Add to this the great natural strength of Ric-wiL vitreous tile.

3. Joint Is Actually Locked.
The rough matched edges along split sides of top and bottom sections, with no cement between them, form perfect seats, which are locked together with cement in the Loc-liP, assuring permanent rigidity that defies breaking open.

4. Fool-Proof.
The new design makes top and bottom halves interchangeable because they are exactly alike. No "up-side-down" to be guarded against.

5. Cementing Extra Easy.
Joints do not require cement at time top sections are set on. Top halves can quickly be put in place to protect the insulating work from weather and cemented later, whole run from one mix.

6. A Visible Joint.
The Loc-liP is an outside joint and fully visible. Inspectors can tell by a glance from the top of the trench that the cement has been properly applied.

7. RESULT—Permanently Dry Insulation.
Whatever insulation is used, you can depend on Ric-wiL with the Loc-liP Joint to keep it dry and therefore at its best efficiency—ALWAYS!

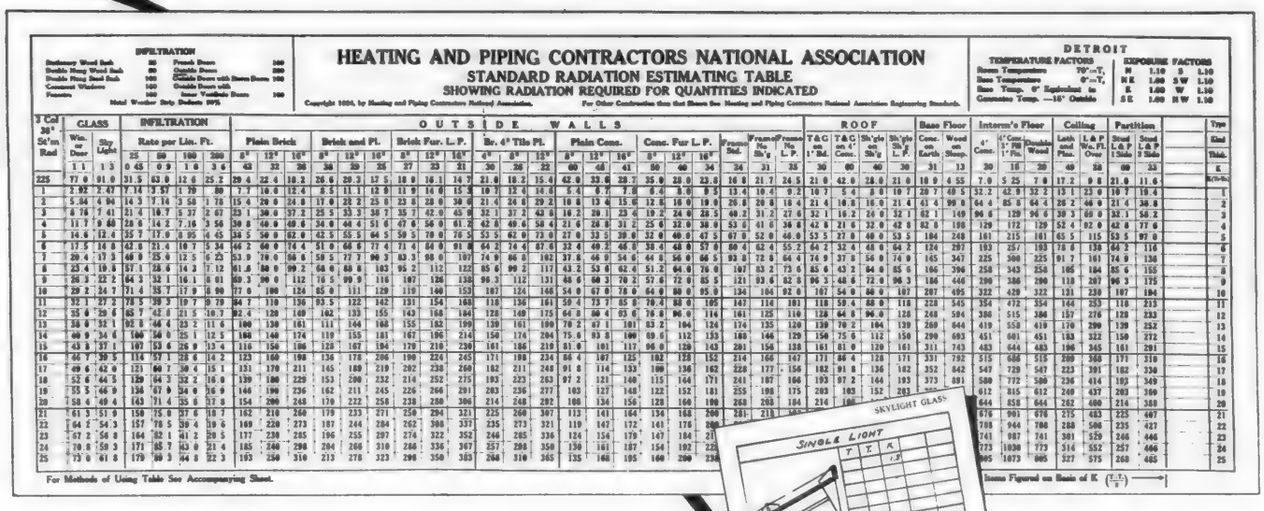
Put your underground pipes "once and for always" in Ric-wiL conduit

THE RIC-WIL COMPANY, CLEVELAND, OHIO

RIC-WIL

UNDERGROUND CONDUIT

Save Your Time and Money



INFILTRATION

Stationary Wood Sash	30	French Doors	160
Double Hung Wood Sash	80	Outside Doors	200
Double Hung Steel Sash	100	Outside Doors with Storm Doors	90
Casement Windows	100	Outside Doors with Vestibule Doors	100
Transoms	160	Inner Vestibule Doors	160

Metal Weather Strip Deducts 10%

HEATING AND PIPING CONTRACTORS NATIONAL ASSOCIATION

STANDARD RADIATION ESTIMATING TABLE

SHOWING RADIATION REQUIRED FOR QUANTITIES INDICATED

Copyright 1924, by Heating and Piping Contractors National Association. For Other Construction than that Shown See Heating and Piping Contractors National Association Engineering Standards.

DETROIT

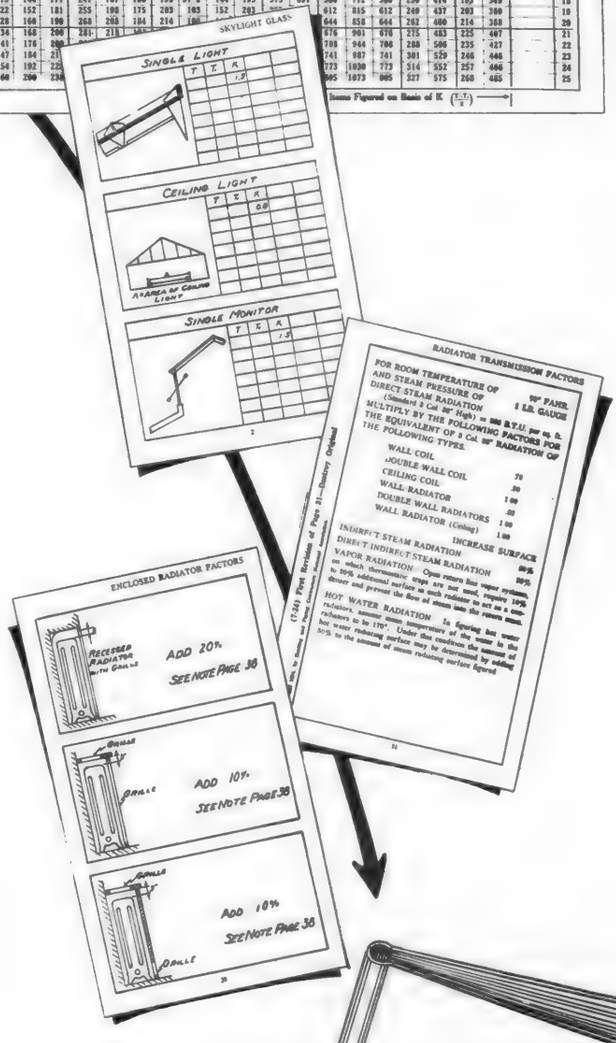
TEMPERATURE FACTORS: Steam Temperature 70°=T; Base Temperature 0°=T; Base Temp. 0° Equivalent to Constructor Temp. —15° Outside

EXPOSURE FACTORS: N 1.10 S 1.30; NE 1.00 SW 1.10; E 1.00 W 1.10; SE 1.00 NW 1.10

3 Col 36° Stm Rad	GLASS: Win. or Door	GLASS: Sky Light	INFILTRATION: Rate per Lin. Ft. 25	50	100	200	OUTSIDE WALLS: Plain Brick 8"	12"	16"	Brick and Pl. 8"	12"	16"	Brick Fur. L. P. 8"	12"	16"	Br. 4" Tile Pl. 4"	8"	12"	Plain Conc. 8"	12"	16"	Conc. Fur. L. P. 8"	12"	16"	Frame Sht.	Frame No. Sh'g	Frame No. L. P.	ROOF: T&G on 1" Sd.	T&G on 4" Conc.	Sh'gle on Sh'g	Sh'gle on Sh'g & L. P.	Base Floor: Conc. on Earth	Wood on Sleep.	Ceiling: 4" Conc.	½" Conc. on 1" Pin.	Portable	Lath and Plas.	L & P Wo. Fl. Over	Partition: Stud L & P 1 Side	Stud L & P 2 Side		Type Kind Thick.
	1.1	1.3	0.45	0.9	1.0	3.6	63	52	308	58	50	292	57	53	21	30	58	22	60	48	41	50	46	34	34	31	35	30	60	60	30	31	13	20	15	30	7.0	5.25	7.0	17.2	9.6	21.0	11.6		S/S-½
225	77.0	91.0	31.5	63.0	12.6	25.2	29.4	22.4	10.2	28.6	29.3	12.5	18.9	16.1	14.7	21.0	18.2	15.4	42.0	32.6	29.7	35.0	28.0	23.0	16.8	21.7	24.5	21.0	42.0	28.0	21.0	10.9	4.55	7.0	5.25	7.0	17.2	9.6	21.0	11.6			1
1	2.82	2.47	7.14	3.57	1.39	.80	7.7	10.0	12.4	8.5	11.1	12.9	11.9	14.0	15.8	10.7	12.4	16.0	5.4	6.7	7.8	6.0	8.0	9.5	13.4	10.4	9.2	10.7	5.4	8.0	10.7	20.7	48.5	52.2	42.9	32.2	13.1	23.0	10.7	19.4			1
2	5.64	4.94	14.3	7.14	3.56	1.78	15.4	20.0	24.8	17.0	22.2	25.8	23.8	28.0	30.0	21.4	24.8	29.2	10.8	13.4	15.6	12.0	16.0	19.0	26.8	20.8	18.4	21.4	10.8	16.0	21.4	41.4	99.0	64.4	85.8	64.4	26.2	46.0	21.4	38.8			2
3	8.76	7.41	21.4	10.7	5.37	2.67	23.1	30.0	37.2	25.5	33.3	38.7	35.7	42.0	45.0	32.1	37.2	43.8	16.2	20.1	23.4	19.2	24.0	28.5	40.2	31.2	27.6	32.1	16.2	24.0	32.1	62.1	149	96.6	129	96.6	39.3	69.0	32.1	58.2			3
4	11.3	9.88	28.6	14.3	7.16	3.56	30.8	40.0	49.6	34.0	44.4	51.6	47.6	56.0	61.2	42.8	49.6	58.4	21.6	26.8	31.2	25.6	32.0	38.0	53.6	41.6	36.8	42.8	21.6	32.0	42.8	82.8	198	129	172	129	52.4	92.0	42.8	77.6			4
5	14.0	12.4	35.7	17.8	8.95	4.45	38.5	50.0	62.0	42.5	55.5	64.5	59.5	70.0	76.5	53.5	62.0	73.0	27.0	33.5	39.0	32.0	40.0	47.5	67.0	52.0	46.0	53.5	27.0	40.0	53.5	104	248	161	215	161	65.5	115	53.5	97.0			5
6	17.5	14.8	42.8	21.4	10.7	5.34	46.2	60.0	74.4	51.0	66.6	77.4	71.4	84.0	91.8	64.2	74.4	87.6	32.4	40.2	46.8	38.4	48.0	57.0	80.4	62.4	55.2	64.2	32.4	48.0	64.2	124	297	193	257	193	78.6	138	64.2	116			6
7	20.4	17.3	49.9	25.0	12.5	6.23	53.9	70.0	86.8	59.5	77.7	90.3	83.3	98.0	107	74.9	86.8	102	37.8	46.9	54.6	44.8	56.0	66.5	93.8	72.8	64.4	74.9	37.8	56.0	74.9	145	347	225	300	225	91.7	161	74.9	136			7
8	23.4	19.8	57.1	28.6	14.3	7.12	61.6	80.0	99.2	68.0	88.8	103	95.2	112	122	85.6	99.2	117	43.2	53.6	62.4	51.2	64.0	76.0	107	83.2	73.6	85.6	43.2	64.0	85.6	166	396	258	343	258	105	184	85.6	155			8
9	26.3	22.2	64.3	32.1	16.1	8.01	69.3	90.0	112	76.5	99.9	116	107	126	138	96.3	112	131	48.6	60.3	70.2	57.6	72.0	85.5	121	93.6	82.8	96.3	48.6	72.0	96.3	186	446	290	386	290	118	207	96.3	175			9
10	29.2	24.7	71.4	35.7	17.9	8.90	77.0	100	124	85.0	111	129	119	140	153	107	124	146	54.0	67.0	78.0	64.0	80.0	95.0	134	104	92.0	107	54.0	80.0	107	207	495	322	429	322	131	230	107	194			10
11	32.1	27.2	78.5	39.3	19.7	9.79	84.7	110	136	93.5	122	142	131	154	168	118	136	161	59.4	73.7	85.8	70.4	88.0	105	147	114	101	118	59.4	88.0	118	228	545	354	472	354	144	253	118	213			11
12	35.0	29.6	85.7	42.8	21.5	10.7	92.4	120	149	102	133	155	143	168	184	128	149	175	64.8	80.4	93.6	76.8	96.0	114	161	125	110	128	64.8	96.0	128	248	594	386	515	386	157	276	128	233			12
13	38.0	32.1	92.8	46.4	23.2	11.6	100	130	161	111	144	168	155	182	199	139	161	190	70.2	87.1	101	83.2	104	124	174	135	120	139	70.2	104	139	268	644	419	558	419	170	299	139	252			13
14	40.9	34.6	100	50.0	25.1	12.5	108	140	174	119	155	181	167	196	214	150	174	204	75.6	93.8	109	89.6	112	133	188	146	129	150	75.6	112	150	290	693	451	601	451	183	323	150	272			14
15	43.8	37.1	107	53.6	26.9	13.4	116	150	186	128	167	194	179	210	230	161	186	219	81.0	101	117	96.0	120	143	201	156	138	161	81.0	120	161	311	743	483	644	483	198	345	161	291			15
16	46.7	39.5	114	57.1	28.6	14.2	123	160	198	136	178	206	190	224	245	171	198	234	86.4	107	125	102	128	152	214	166	147	171	86.4	128	171	331	792	515	686	515	209	368	171	310			16
17	49.6	42.0	121	60.7	30.4	15.1	131	170	211	145	189	219	202	238	260	182	211	248	91.8	114	133	109	136	162	228	177	156	182	91.8	136	182	352	842	547	729	547	223	391	182	330			17
18	52.6	44.5	129	64.3	32.2	16.0	139	180	229	153	200	232	214	252	275	193	223	263	97.2	121	140	115	144	171	241	187	166	193	97.2	144	193	373	891	580	772	580	236	414	193	349			18
19	55.5	46.9	136	67.9	34.0	16.9	146	190	236	162	211	245	226	266	291	203	236	277	103	127	148	122	152	181	255	198	175	203	103	152	203			612	815	612	249	437	203	369			19
20	58.4	49.4	143	71.4	35.6	17.8	154	200	248	170	222	258	238	280	306	214	248	292	108	134	156	128	160	190	268	208	184	214	108	160	214	393	940	644	858	644	262	460	214	388			20
21	61.3	51.9	150	75.0	37.6	18.7	162	210	260	179	233	271	250	294	321	225	260	307	113	141	164	134	168	200	281	218	193	225	113	168	225	413	989	676	901	676	275	483	225	407			21
22	64.2	54.3	157	78.5	39.4	19.6	169	220	273	187	244	284	262	308	337	235	273	321	119	147	172	141	176	209	295	229	202	236	119	176	236	433	1038	709	944	708	288	506	235	427			22
23	67.2	56.8	164	82.1	41.2	20.5	177	230	285	196	255	297	274	322	352	246	285	336	124	154	179	147	184	219	308	239	211	246	124	184	246	452	1086	741	987	741	301	529	246	446			23
24	70.0	59.3	171	85.7	43.0	21.4	185	240	298	204	266	310	286	336	367	257	298	350	130	161	187	154	192	228	322	250	220	257	130	192	257	472	1134	773	1030	773	314	553	257	466			24
25	73.0	61.8	179	89.5	44.8	22.3	193	250	310	213	278	323	298	350	383	268	310	365	135	168	195	160	200	238	335	260	229	268	135	200	268	492	1182	805	1073	805	327	575	268	485			25

For Methods of Using Table See Accompanying Sheet.

Items Figured on Basis of K $\left(\frac{T-t}{T}\right)$



Be Absolutely Sure Your Radiation Estimate Is Correct

"Engineering Standards," the book on radiation, compiled and published by the Heating and Piping Contractors National Association takes the guesswork out of Radiation Estimating.

It is a reliable guide that thousands of heating contractors are using. It reduces radiation estimating to a science, with a series of tables including 151 constants for various types of construction and thickness of wall, also infiltration and exposure factors.

Standard Radiation Estimating Tables for the twenty-four cities listed below are available in addition to this comprehensive book:

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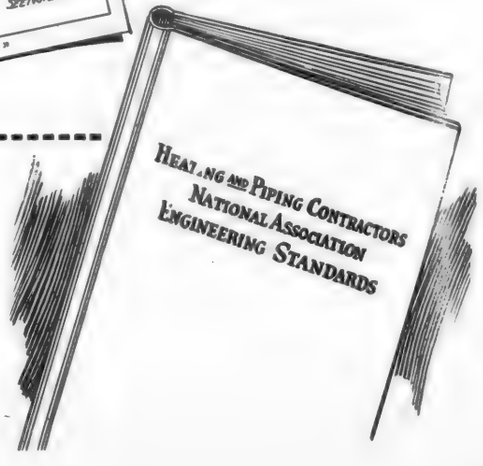
Boston, Mass.	Milwaukee, Wis.
Buffalo, N. Y.	New York, N. Y.
Chicago, Ill.	Philadelphia, Pa.
Cincinnati, Ohio	Pittsburgh, Pa.
Cleveland, Ohio	Portland, Ore.
Detroit, Mich.	Salt Lake City, Utah
Denver, Colo.	San Antonio, Texas
Eastport, Me.	San Francisco, Cal.
Kansas City, Mo.	St. Louis, Mo.
Los Angeles, Cal.	St. Paul, Minn.
Madison, Wis.	Washington, D. C.

The Heating and Piping Contractors National Association, now in its 37th year, comprises America's leaders in heating and piping work. "Engineering Standards" is a notable example of the beneficial work of that organization.

The complete work in a loose-leaf binder may be obtained by readers of this magazine for $5.00—a cost which is small compared with the money and time it will save you in correctly estimating radiation.



HEATING AND VENTILATING MAGAZINE,
1123 Broadway, New York, N. Y.

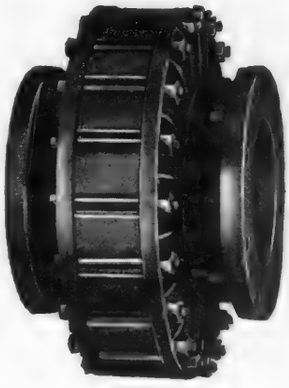
Send me copy of "Engineering Standards" complete with all data necessary to correctly estimate radiation in any type of building. Also include Radiation Table for City of.....
(If your city is not listed, request chart for city nearest to your locality).
Enclosed find $5.00 to cover cost and postage.

Name .....

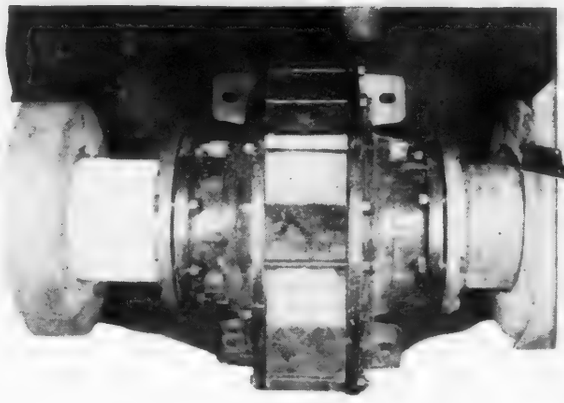
Address .....

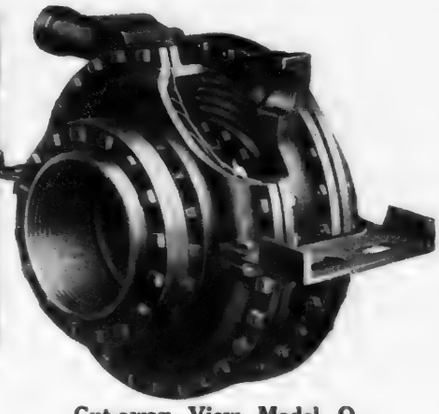
City and State.....

ADSCO EXPANSION JOINTS



Model P Variator for 125 lbs. pressure.





Cut-away View Model O Variator for 50 lbs. pressure.

An ADSCO Variator After 27 Years Service

The illustration shows an Adsco Variator (the trade-name for Adsco Packless Expansion Joint) which was installed in Myrtle St., Erie, Pa., in 1898. In 1925, the steam line was replaced by a larger size. The variator was none the worse for its 27 years of service and was installed in another line farther down Myrtle St.

A remarkable record yet not an exception. There are thousands of Adsco Variators which have been in service up to forty years.

The expansion member in the Adsco Variator consists of a corrugated copper diaphragm. The special annealing process, repeated while corrugating, gives the diaphragm an extreme flexibility. The surface of the diaphragm is so large in proportion to the movement caused by the expansion and contraction, that the strain at any one point is negligible. The diaphragms are protected against steam pressure by steel backing plates.

Write for Bulletin 182-H giving tabulation of expansion in pipe lines and description of Adsco Expansion Joints for every pressure and service condition.

AMERICAN DISTRICT STEAM COMPANY

GENERAL OFFICES AND WORKS

NORTH TONAWANDA, N.Y.

Offices: New York Chicago Seattle

---------- *Pin This Coupon to Your Letterhead* ----------

AMERICAN DISTRICT STEAM COMPANY NORTH TONAWANDA, N. Y.

Please send Bulletin 182-H giving tabulation of expansion in pipe lines and description of Adsco Expansion Joints and Variators for every pressure and service condition.

Name .....

Address .....

"Keeping Others In Hot Water"—

for
Hotels, apartment buildings, hospitals, Y. M. C. A. buildings, schools and laundries

Special Attention Given to Installations Requiring Large Quantities of Hot Water, with Live or Exhaust Steam as the Heating Medium.

—may be a pastime for some folks, but for the Sims Company it is a serious proposition—a matter requiring a thorough knowledge of hot water requirements.

A long study of these requirements enables us to offer heaters that assure constant and efficient hot water service.

Engineers feel safe in specifying "SIMS" because they know it means **reliability**—a service you want to render your client.

SIMS CLEAN E-Z STEAM TUBE STORAGE HEATER

Our Engineers will gladly confer with you, without obligation, on your hot water problems.

THE SIMS CO.

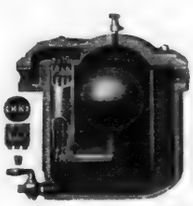
Erie, Pa.

A good place to live, to work and to play.

WRIGHT-AUSTIN

"EMERGENCY" STEAM TRAPS

High Pressure



Handles light loads without wire-drawing, heavy loads without choking. Has very large capacity for emergencies. Requires no change of valves from 0 lbs. to 200 lbs. pressure.

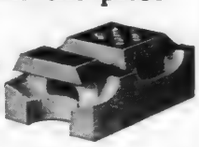
Ask for Bulletin No. 201

WRIGHT-AUSTIN CO.
DETROIT, MICH.

Do You Still Use Large Domestic Coal?

Why not economize by using Buckwheat Coal—at about half the price of domestic coal.

You can burn Buckwheat with PYRAMID GRATES



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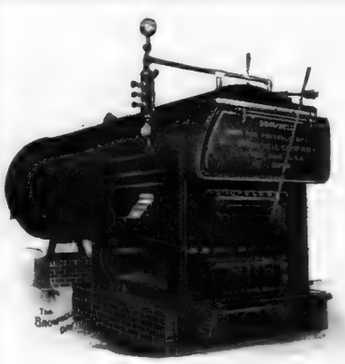
PYRAMID IRON PRODUCTS CO.
136 Liberty Street **New York City**



Brownell Return Flue Portable Heating Boiler—Smokeless Type

BROWNELL

Better Boilers for Heating and Power Purposes
70TH YEAR

of successful manufacturing experience. This is the reason why Brownell Boilers are specified by all the leading Heating and Contracting Engineers.

BROWNELL Steel Heating Boilers are
LOW IN FIRST COST
HIGH IN EFFICIENCY
BUILT TO LAST A LIFETIME

Our reputation is your insurance of a high quality product. Let us solve your heating problems. Sales representatives in all principal cities. Send for them.

THE BROWNELL CO.
DAYTON, OHIO

THE BROWNELL COMPANY — The World Over — SINCE 1855 — DAYTON, OHIO, U.S.A.

Established 1855

Send for Bulletins B 6 B 6 A

BOILERS

No Location is Difficult for a BADGER Installation

The location of an expansion joint is determined by necessity rather than choice. And many places do not allow an over abundance of room to work in. Sometimes the trench is of necessity not much larger than the pipe itself, and in many cases a trench or tunnel must accommodate several pipe lines.

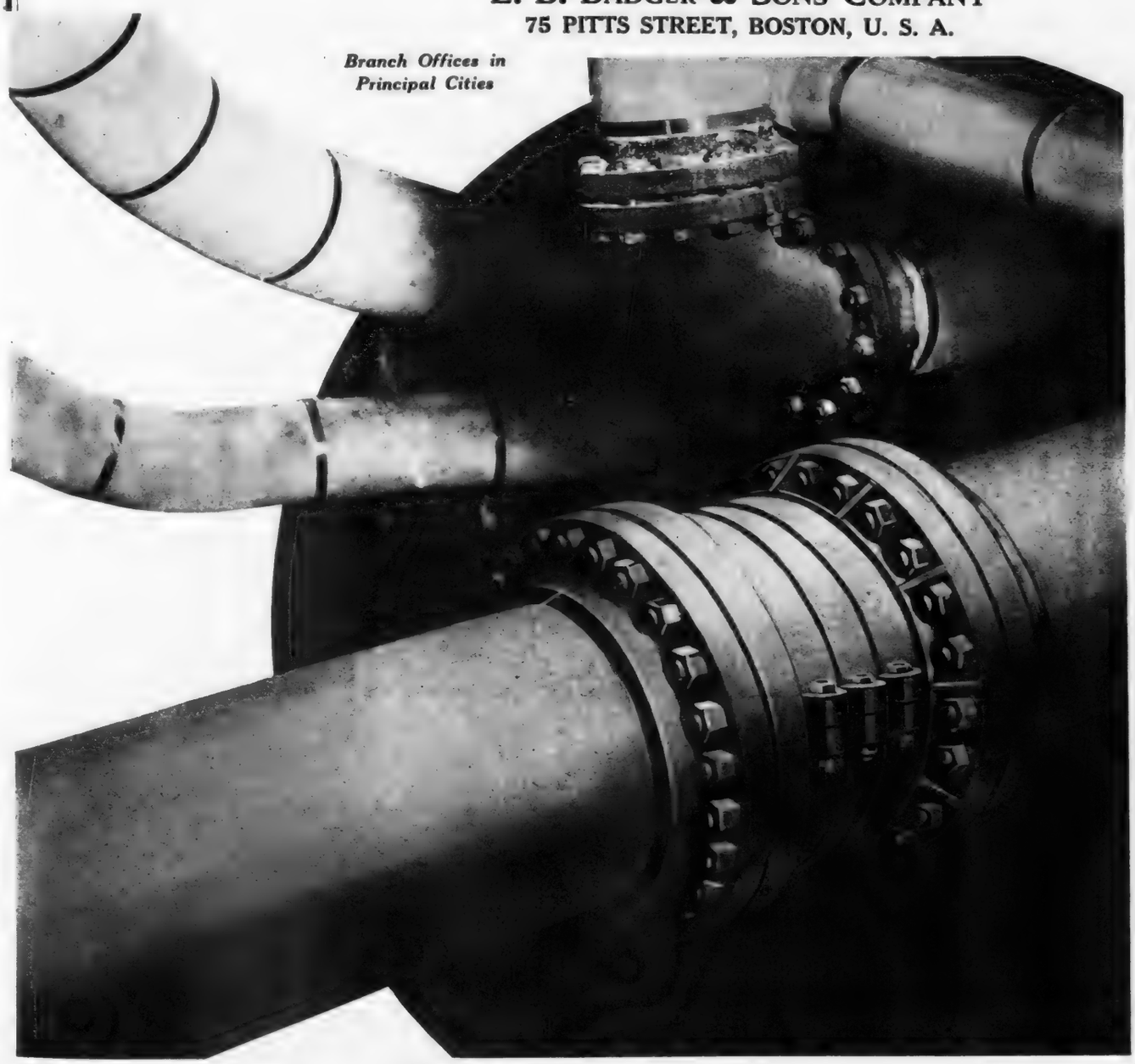
The installation below of a **Badger Self-Equalizing Expansion Joint** shows how easily all the difficulty of limited space is overcome when **Badger Expansion Joints** are used. They are merely bolted in place just as if they were a small section of the pipe itself.

No leaks, no packing, no adjusting, no further attention.

Badger Expansion Joints are serving some of the largest steam jobs in the country. Let our engineers tell you more about them and advise you in your expansion problems.

E. B. BADGER & SONS COMPANY
75 PITTS STREET, BOSTON, U. S. A.

Branch Offices in Principal Cities



ENGINEERS' SPECIFICATION INDEX

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Nash Engineering Co., So. Norwalk, Conn.
Powers Regulator Co., Chicago, Ill.

AIR CONDITIONING APPARATUS.
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Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, O.
Carrier Air Conditioning Co., of America, Buffalo, N. Y.
Carrier Engineering Corporation, Newark, N.J.
Clarage Fan Co., Kalamazoo, Mich.
Drying Systems, Inc., Chicago, Ill.
Fleisher Co., Inc., W. L. New York.
Grinnell Company, Providence, R. I.
Ilg Electric Ventilating Co., Chicago, Ill.
Massachusetts Blower Co., Watertown, Mass.
Midwest Air Filters, Inc., New York.
New York Blower Co., Chicago, Ill.
Reed Air Filter Co., Inc., Louisville, Ky.
Spray Engineering Co., Boston, Mass.
Sturtevant Co., B. F., Hyde Park, Mass.
L. J. Wing Mfg. Co., New York.

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York Heating & Ventilating Co., Philadelphia, Pa.

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O-E Specialty Mfg. Co., Milwaukee, Wis.
Midwest Air Filters, Inc., New York.

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Drying Systems, Inc., Chicago, Ill.
Duro Air Filter Co., Chicago, Ill.
Midwest Air Filters, Inc., New York.
National Air Filter Co., Chicago, Ill.
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Spray Engineering Co., Boston, Mass.

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Hoffman Specialty Co., New York.

AIR WASHERS.
American Blower Co., Detroit, Mich.
Badger & Sons Co., E. B., Boston, Mass.
Bayley Mfg. Co., Milwaukee, Wis.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corp., Newark, N. J.
Clarage Fan Co., Kalamazoo, Mich.
Cooling Tower Co., Inc., New York.
Fleisher Co., Inc., W. L. New York.
Ilg Electric Ventilating Co., Chicago, Ill.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Reed Air Filter Co., Inc., Louisville, Ky.
Spray Engineering Co., Boston, Mass.
Sturtevant Co., B. F., Hyde Park, Mass.

BLOWERS
Fan.
American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
DeBothezat Engineering Co., New York.
Ilg Electric Ventilating Co., Chicago, Ill.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Pecco, Inc., St. Louis, Mo.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Mass.
L. J. Wing Mfg. Co., New York.
York Heating & Ventilating Co., Philadelphia, Pa.

Pressure.
American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
DeBothezat Engineering Co., New York.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Mass.
L. J. Wing Mfg. Co., New York.

Rotary.
Sturtevant Co., B. F., Hyde Park, Mass.
L. J. Wing Mfg. Co., New York.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

Turbine.
Sturtevant Co., B. F., Hyde Park, Mass.
L. J. Wing Mfg. Co., New York.

BLOW OFF BASINS.
Cast Iron.
Inland Iron Works, Joliet, Ill.

BOILER CEMENT.
Johns-Manville, Inc., New York.

BOILERS.
Down-Draft.
American Radiator Co., Chicago, Ill.
Brownell Co., The, Dayton, O.
General Boilers Co., Waukegan, Ill.
Hart and Crouse, Utica, N. Y.
Illinois Malleable Iron Co., Chicago, Ill.
Kewanee Boiler Co., Kewsanee, Ill.
Molby Boiler Co., New York.
Page Boiler Co., Wm. H., New York.
Pierce, Butler & Pierce Mfg. Co., New York.
Stanwood Corporation, Cincinnati, Ohio.
Titusville Iron Works, Titusville, Pa.

Gas Fired
Evenheat Mfg. Co., Chicago, Ill.

Heating.
American Radiator Co., Chicago, Ill.
Brownell Co., The, Dayton, O.
Burnham Boiler Corp., Irvington, N. Y.
Continental Heater Corp., Dunkirk, N. Y.
Evenheat Mfg. Co., Chicago, Ill.
Frost Mfg. Co., Chicago, Ill.
General Boilers Co., Waukegan, Ill.
Gorton & Lidgerwood Co., New York.
Grinnell Company, Providence, R. I.
Gurney Heater Mfg. Co., Boston, Mass.
Heggie Simplex Boiler Co., Joliet, Ill.
Illinois Malleable Iron Co., Chicago, Ill.
International Heater Co., Utica, N. Y.
Kewanee Boiler Co., Kewanee, Ill.
Lebanon Boiler Works, Lebanon, Pa.
Molby Boiler Co., New York.
National Radiator Co., Johnstown, Pa.
Niagara Radiator & Boiler Co., North Tonawanda, N. Y.
Page Boiler Co., Wm. H., New York
Pierce, Butler & Pierce Mfg. Co., New York.
Standard Heater Co., Williamsport, Pa.
Stanwood Corporation, Cincinnati, Ohio.
Thatcher Co., Newark, N. J.
Titusville Iron Works, Titusville, Pa.
United States Radiator Corp., Detroit, Mich.
Utica Heater Co., Utica, N. Y.
Weil-McLain Co., Chicago, Ill.

Power.
Frost Mfg. Co., Chicago, Ill.
Heggie Simplex Boiler Co., Joliet, Ill.
Kewanee Boiler Co., Kewanee, Ill.
Pierce, Butler & Pierce Mfg. Co., New York.
Stanwood Corporation, Cincinnati, Ohio.
Titusville Iron Works Co., Titusville, Pa.

CALORIMETERS.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Sarco Co., New York.

COILS, PIPE.
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N. Y.
Griscom-Russell Co., New York.
National Pipe Bending Co., New Haven, Conn.
Pecco, Inc., St. Louis, Mo.
Whitlock Coil Pipe Co., Hartford, Conn.

Air.
New York Blower Co., Chicago, Ill.

CONCRETE INSERTS
Frank Radiator Bracket Co., Chicago, Ill.
Little Giant Mfg. Co., Minneapolis, Minn.

CONDENSERS.
Alberger Heater Co., Buffalo, N. Y.
American Radiator Co., Chicago, Ill.
American Steam Pump Co., Battle Creek, Mich.
Buffalo Forge Co., Buffalo, N. Y.
Davis Engineering Co., New York.
Griscom-Russell Co., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Wheeler Condenser & Engineering Co., Carteret, N. J.
Whitlock Coil Pipe Co., Hartford, Conn.

CONVERTERS, HOT WATER.
Alberger Heater Co., Buffalo, N. Y.
Davis Engineering Co., New York.
Griscom-Russell Co., New York.
National Pipe Bending Co., New Haven, Conn.
Patterson-Kelley Co., New York.
Ross Heater & Mfg. Co. Inc., Buffalo, N. Y.
Whitlock Coil Pipe Co., Hartford, Conn.
Wyckoff & Son Co., A., Elmira, N. Y.

COOLERS.
Oil.
Alberger Heater Co., Buffalo, N. Y.
Davis Engineering Co., New York.
Griscom-Russell Co., New York.
National Pipe Bending Co., New Haven, Conn.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Whitlock Coil Pipe Co., Hartford, Conn.

COOLING TOWERS.
Badger & Sons Co., E. B., Boston, Mass.
Cooling Tower Co., New York.
Spray Engineering Co., Boston, Mass.

COPPER BOILERS.
Dahlquist Mfg. Co., Boston, Mass.

COPPER KETTLES.
Dahlquist Mfg. Co., Boston, Mass.

COVERING PIPE.
American District Steam Co., No. Tonawanda, N. Y.
Hornung, J. C., Chicago, Ill.
Johns-Manville Inc., New York.
Pearce & Co., W. H., Chicago, Ill.
Ric-Wil Co., Cleveland, O.
Wyckoff & Son Co., A, Elmira, N. Y.

DAMPERS, DUCT.
American Blower Co., Detroit, Mich.
Buckeye Blower Co., Columbus, O.
York Heating & Ventilating Co., Philadelphia, Pa

DEHUMIDIFYING APPARATUS.
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., Milwaukee, Wis.
Carrier Engineering Corp., Newark, N. J.
Cooling Tower Co., New York.
Fleisher Co., Inc., W. L., New York.
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Mass.

DISTILLERS, (Water).
Badger & Sons Co., E. B., Boston, Mass.
Davis Engineering Co., New York.
Griscom-Russell Co., New York.
Ross Heater & Mfg. Co. Inc., Buffalo, N. Y.

DRAFT APPLIANCES.
Crown Fuel Saver Co., Richmond, Ind.
Wolff Coal Saver Co., Chicago, Ill.

DRYING SYSTEMS.
(See Air Cooling and Drying Systems.)

DUST COLLECTING SYSTEMS.
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, New York.
Clarage Fan Co., Kalamazoo, Mich.
Massachusetts Blower Co., Watertown, Mass
New York Blower Co., Chicago, Ill.
Pecco, Inc., St. Louis, Mo.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Mass.
York Heating & Ventilating Co., Philadelphia, Pa

DUST COLLECTORS.
American Blower Co., Detroit, Mich.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Co., Newark, N. J.
Clarage Fan Co., Kalamazoo, Mich.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Pecco, Inc., St. Louis, Mo.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F. Hyde Park, Mass.
York Heating & Ventilating Co., Philadelphia, Pa

ENGINES.
Steam, Automatic.
American Blower Co., Detroit, Mich.
Brownell Co., The, Dayton, O.
Clarage Fan Co., Kalamazoo, Mich.
New York Blower Co., Chicago, Ill.
Stanwood Corporation, Cincinnati, Ohio.
Sturtevant Co., B. F., Hyde Park, Mass.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

Steam, High Speed.
American Blower Co., Detroit, Mich.
Brownell Co., The, Dayton, O.
Clarage Fan Co., Kalamazoo, Mich.
New York Blower Co., Chicago, Ill.
Pierce, Butler & Pierce Mfg. Co., New York.
Sturtevant Co., B. F., Hyde Park, Mass.

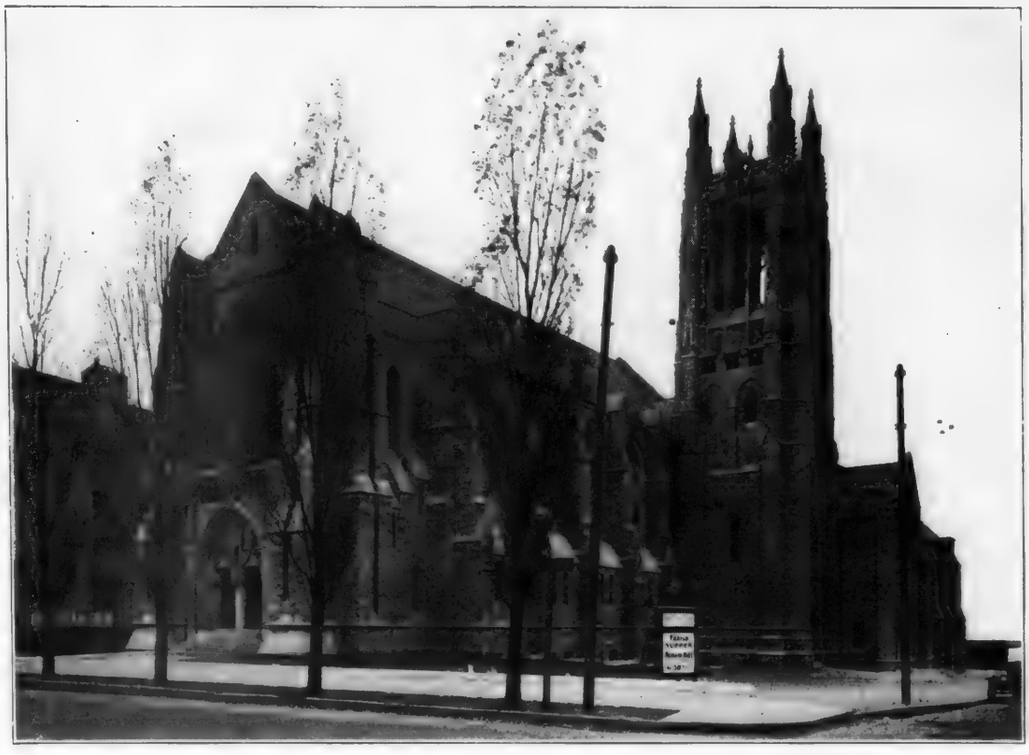
EQUALIZING LOOPS.
Hoffman Specialty Co., New York.

EVAPORATORS.
Boiler Feed Make-Up.
Badger & Sons Co., E. B., Boston, Mass.
Davis Engineering Co., New York.
Griscom-Russell Co., New York.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y.
Whitlock Coil Pipe Co., Hartford, Conn.

EXHAUST HEADS.
Aeolus Dickinson Co., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Patterson-Kelley Co., New York.
Pecco, Inc., St. Louis, Mo.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Mass
Wright-Austin Co., Detroit, Mich.

Heating Churches

With the Barnes & Jones System



SECOND UNIVERSALIST CHURCH—Boston

Allen & Collens, Architects
Barber Co., Heating Engineers

L. P. Soule & Son Co., Gen'l Cont.
Cleghorn Co., Heating Contractors

THE beauty of a church is a source of pride to the congregation—and a mark of reputation to its architect, builder or engineer.

ARCHITECTS, builders and engineers know that when the cold winds of winter come the beauty of a church may be soon forgotten in the discomfort of unsatisfactory heating.

BARNES & JONES Vapor and Vacuum Heating Systems of Proven Quality have been specified frequently by architects, builders and engineers of national reputation for church heating, because they knew the guarantee of quality and satisfactory performance that our twenty-five years experience insured.

VAPOR and VACUUM HEATING SYSTEMS of PROVEN QUALITY

Barnes & Jones

Representatives in Principal Cities

5 MELROSE STREET BOSTON, MASSACHUSETTS

ENGINEERS' SPECIFICATION INDEX (Continued)

EXHAUST SYSTEMS.

American Blower Co., Detroit, Mich.
Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N Y.
Ilg Electric Ventilating Co., Chicago, Ill.
Pecco, Inc., St. Louis, Mo.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Mass.
Wing Mfg. Co., L. J., New York.
York Heating & Ventilating Co., Philadelphia, Pa.

EXPANSION JOINTS.

American District Steam Co., No. Tonawanda, N. Y.
Badger & Sons Co., E. B., Boston, Mass.
Central Station Steam Co., Detroit, Mich.
Dahlquist Mfg. Co., Boston, Mass.
Griscom-Russell Co., New York.
Hornung, J. C., Chicago, Ill.
Howard Iron Works, Buffalo, N. Y.
Illinois Engineering Co., Chicago, Ill.
Pearce & Co., W. H., Chicago, Ill.
Ric-Wil Co., Cleveland, O.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Webster & Co., Warren, Camden, N. J.
Wheeler Condenser & Engineering Co., Carteret, N. J.

EXPANSION SHELLS

Phillips Drill Co., Chicago, Ill.

FANS, EXHAUST.

American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
DeBothezat Engineering Co., New York.
Ilg Electric Ventilating Co., Chicago, Ill.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Pecco, Inc., St. Louis, Mo.
Seymour, James M., Newark, N. J.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Mass.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
L. J. Wing Mfg. Co., New York.
York Heating & Ventilating Co., Philadelphia, Pa.

FEEDERS

Boiler

Kieley & Mueller, Inc., New York.
McDonnell & Miller, Chicago, Ill.

FILTERS, (Aerating).

Davis Engineering Corp., New York.
Griscom-Russell Co., New York.

Feed-Water.

Davis Engineering Co., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.

FITTINGS, FLANGED.

American District Steam Co., No. Tonawanda, N. Y.
Clow and Sons, Jas. B., Chicago, Ill.
Grinnell Company, Providence, R. I.

FLANGES.

American District Steam Co., No. Tonawanda, N. Y.
Jenkins Bros., New York.

GAS BURNERS

Cleveland Gas Burner & Appliance Co., Cleveland, Ohio.
Franklin Gas Burner Mfg. Co., Cincinnati, O.

GASKETS, METALLIC.

Sarco Co., New York.

GAUGE BOARDS.

American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bishop & Babcock Co., Cleveland, Ohio.
Bristol Co., Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
McAlear Mfg. Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
Webster & Co., Warren, Camden, N. J.

GAUGES.

Altitude

Pierce, Butler & Pierce Mfg. Co., New York.

Draft.

American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.

Hydraulic.

American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.

Ounce Graduated.

Marsh & Co., Jas. P., Chicago, Ill.
O-E Specialty Co., Milwaukee, Wis.

Pressure.

American Dist. Steam Co., North Tonawanda, N. Y.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bristol Co., Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Pierce, Butler & Pierce Mfg. Co., New York.
Webster & Co., Warren, Camden, N. J.
Bishop & Babcock Co., Cleveland, Ohio.

Vacuum.

American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bristol Co., Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Pierce, Butler & Pierce Mfg. Co., New York.
Webster & Co., Warren, Camden, N. J.

Vacuum (Compound).

Cashin Co., W. D., Boston, Mass.
Pierce, Butler & Pierce Mfg. Co., New York.

Water.

American District Steam Co., No. Tonawanda, N. Y.
American Schaeffer & Budenburg Corp., Brooklyn, N. Y.
Bristol Co., Waterbury, Conn.
Bristol Co., Waterbury, Conn.
Jenkins Bros., New York.

GENERATOR COOLING SYSTEMS.

Bayley Mfg. Co., Milwaukee, Wis.
Carrier Air Conditioning Co., of America, Buffalo, N. Y.
Cooling Tower Co., New York.
Spray Engineering Co., Boston, Mass.
Sturtevant Co., B. F., Hyde Park, Mass.

GOVERNORS, (Pump).

Atlas Valve Co., Newark, N. J.
Davis Regulator Co., G. M., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Mason Regulator Co., Boston, Mass.
Stickle Steam Specialties Co., Indianapolis, Ind.
Westinghouse Elec. &. Mfg. Co., East Pittsburgh, Pa.
Wright-Austin Co., Detroit, Mich.

GRATES

Dumping

Pyramid Iron Products Co., New York.

Rocking

Pyramid Iron Products Co., New York.

Shaking

Pyramid Iron Products Co., New York.

Shaking and Dumping

Pyramid Iron Products Co., New York.

Shaking, Circular

Pyramid Iron Products Co., New York.

Stationary

Pyramid Iron Products Co., New York.

HEATERS.

Domestic Water.

Alberger Heater Co., Buffalo, N. Y.
American District Steam Co., No. Tonawanda, N. Y.
American Radiator Co., Chicago, Ill.
Burnham Boiler Corp., Irvington, N. Y.
Dahlquist Mfg. Co., Boston, Mass.
Davis Engineering Co., New York.
Everhot Heater Co., Detroit, Mich.
Excelso Specialty Works, Buffalo, N. Y.
National Pipe Bending Co., New Haven, Conn.
Page Boiler Co., Wm. H., New York.
Patterson-Kelley Co., New York.
Pierce, Butler & Pierce Mfg. Co., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Sims Co., Erie, Pa.
Standard Heater Co., Williamsport, Pa.
Thermal Appliance Co., New York.
Whitlock Coil Pipe Co., Hartford, Conn.

Electrical Unit

Ilg Electric Ventilating Co., Chicago, Ill.

Feed Water, (Closed).

Alberger Heater Co., Buffalo, N. Y.
Davis Engineering Co., New York.
Griscom-Russell Co., New York.
McAlear Mfg. Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Patterson-Kelley Co., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Sims Co., Erie, Pa.
Wheeler Condenser & Engineering Co., Carteret, N. J.
Whitlock Coil Pipe Co., Hartford, Conn.

Feed Water, (Open).

Griscom-Russell Co., New York.
Sims Co., Erie, Pa.
Stickle Steam Specialties Co., Indianapolis, Ind.
Webster & Co., Warren, Camden, N. J.

Fuel-oil.

Alberger Heater Co., Buffalo, N. Y.
American Blower Co., Detroit, Mich.
Davis Engineering Corp., New York.
Drying Systems, Inc., Chicago, Ill.
Griscom-Russell Co., New York.
National Pipe Bending Co., New Haven, Conn.
Ross Heater & Mfg. Inc., Buffalo, N. Y.
Whitlock Coil Pipe Co., Hartford, Conn.

Air, Fan System.

Aerofin Corporation, Newark, N. J.
American Blower Co., Detroit, Mich.
American Radiator Co., Chicago, Ill.
Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Drying Systems, Inc., Chicago, Ill.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Mass.

Magazine Feed

Standard Heater Co., Williamsport, Pa.

Portable Unit Air.

American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Buffalo Forge Co., Buffalo, N. Y.
Dwyer Equipment Co., Chicago, Ill.
Ilg Electric Ventilating Co., Chicago, Ill.
Mueller Furnace Co., L. J., Milwaukee, Wis.
Pecco Incorporated, St. Louis, Mo.
Skinner Bros. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Mass.
L. J. Wing Mfg. Co., New York.
York Heating & Ventilating Co., Philadelphia, Pa
(See also Ventilators, Portable Unit.)

HEATING SYSTEMS.

"Gasteam".

James B. Clow & Sons, Chicago, Ill.

Vacuum.

Barnes & Jones, Boston, Mass.
Bishop & Babcock Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Klipfel Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
O-E Specialty Co., Milwaukee, Wis.
Sarco Co., New York.
Standard Heater Co., Williamsport, Pa.
Sterling Engineering Co., Milwaukee, Wis.
Stickle Steam Specialties Co., Indianapolis, Ind
Webster & Co., Warren, Camden, N. J.

Vapor.

American District Steam Co., No. Tonawanda N. Y.
Barnes & Jones, Boston, Mass.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Gorton & Lidgerwood Co., New York.
Grinnell Company, Providence, R. I.
Haines & Co., Wm. S., Philadelphia, Pa.
Ideal Heating Equip. Co., Cleveland, Ohio
Illinois Engineering Co., Chicago, Ill.
Illinois Malleable Iron Co., Chicago, Ill.
Klipfel Mfg. Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Mouat Vapor Heating Co., Cleveland, O.
Nelson Corporation, Herman, Moline, Ill.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Sarco Co., New York.
Simplex Heating Specialty Co., Inc., Lynchburg, Va.
Standard Heater Co., Williamsport, Pa.
Sterling Engineering Co., Milwaukee, Wis.
Trane & Co., La Crosse, Wis.
Vapor Engineering Co., New York.
Webster & Co., Warren, Camden, N. J.

Water.

Grinnell Company, Providence, R. I.
Patterson-Kelley Co., New York.
Standard Heater Co., Williamsport, Pa.
Thrush & Co., H. A., Peru, Ind.

HUMIDIFIERS

American Blower Co., Detroit, Mich.
Bayley Mfg. Co., Milwaukee, Wis.
Carrier Air Conditioning Co., of America, Buffalo, N. Y.
Carrier Engineering Corporation, Newark, N. J
Drying Systems, Inc., Chicago, Ill.
Grinnell Company, Providence, R. I.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Seymour, James M., Newark, N. J.
Sturtevant Co., B. F., Hyde Park, Mass.

HUMIDITY CONTROL.

American Blower Co., Detroit, Mich.
Atlas Valve Co., Newark, N. J.
Bayley Mfg. Co., Milwaukee, Wis.
Carrier Air Conditioning Co., of America, Buffalo, N. Y
Carrier Engineering Corp., Newark, N. J.
Drying Systems, Inc., Chicago, Ill.
Foxboro Co., Inc., The Foxboro, Mass.
Grinnell Company, Providence, R. I.
Klipfel Mfg. Co., Chicago, Ill.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Mass.

INSTRUMENTS

Electric Measuring.

Bristol Co., Waterbury, Conn.
Westinghouse Electric & Mfg. Co., East Pittsburg, Pa.

Indicating and Recording.

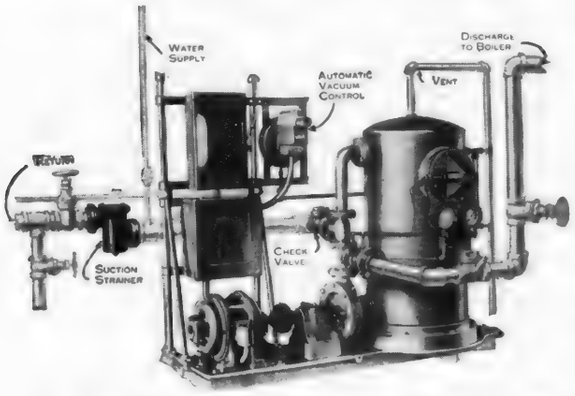
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bristol Co., Waterbury, Conn.
Bailey Meter Co., Cleveland, O.
Foxboro Co., Inc., The Foxboro, Mass.

YOUNG

CENTRIFUGAL VACUUM AND BOILER FEED

Supplied in Standard Units of Seven Capacities

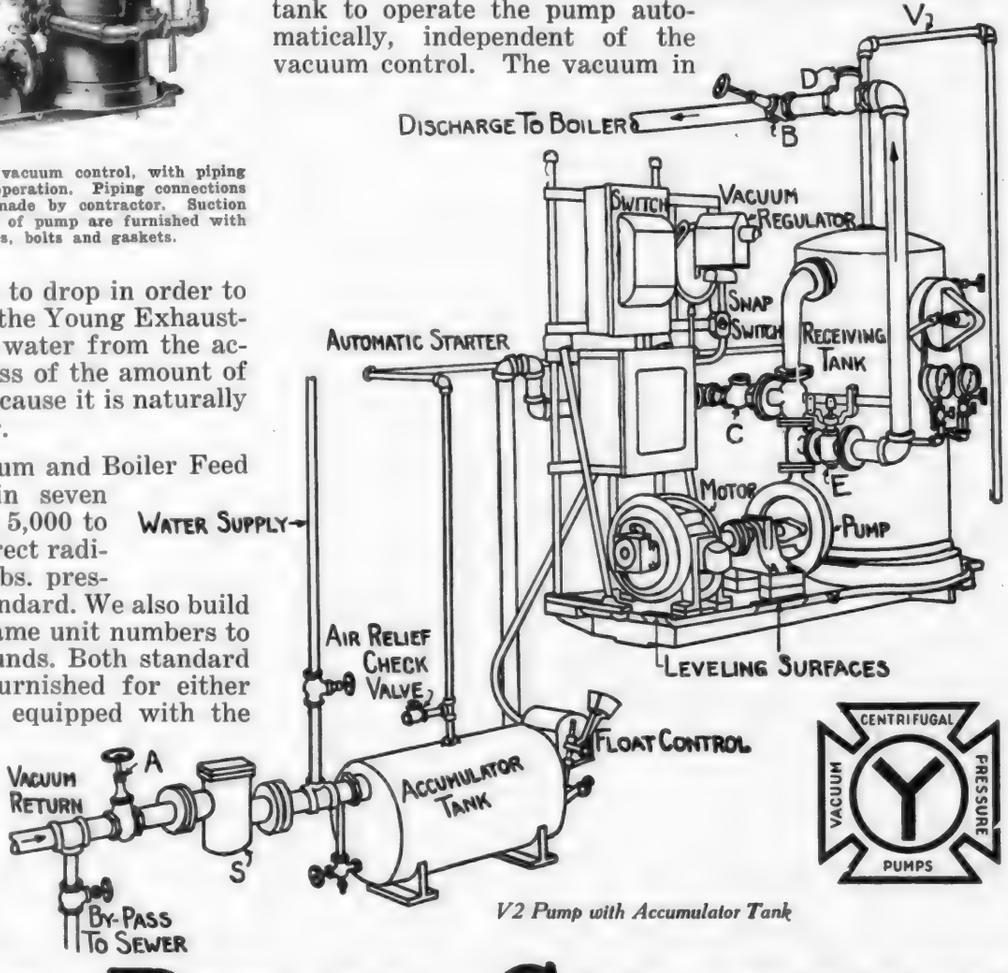
PUMPS



V2 unit equipped for automatic vacuum control, with piping connections made and ready for operation. Piping connections shown in gray tone are to be made by contractor. Suction strainer and check valve at inlet of pump are furnished with unit, as well as companion flanges, bolts and gaskets.

The Young Centrifugal Vacuum and Boiler Feed Pump does not have to be placed in a pit where it is subject to flooding in order to remove the water from low returns by both gravity and vacuum. The pump can be placed on the boiler room floor which drains into the sewer and an accumulator tank is placed in a pit below the level of the return into which the water of condensation will flow by gravity at all times and keep all the returns dry. A float switch is mounted on this tank to operate the pump automatically, independent of the vacuum control. The vacuum in the system does not have to drop in order to keep all returns dry, and the Young Exhauster is able to remove the water from the accumulator tank, regardless of the amount of vacuum in the system, because it is naturally a high vacuum producer.

Young Centrifugal Vacuum and Boiler Feed Pumps are furnished in seven capacities, ranging from 5,000 to 100,000 square feet of direct radiation, and built for 20 lbs. pressure at the pump as a standard. We also build special pumps of these same unit numbers to discharge against 35 pounds. Both standard and special units are furnished for either continuous operation or equipped with the type of automatic control best suited to the specific requirements.



V2 Pump with Accumulator Tank

THE YOUNG PUMP COMPANY

450 East Ohio Street, Chicago

YOUNG PUMP COMPANY

ENGINEERS' SPECIFICATION INDEX (Continued)

Marsh & Co., Jas. P., Chicago, Ill.
Sarco Co., New York
Westinghouse Elec. & Mfg. Co., East Pittsburg, Pa

INSULATING MATERIALS.

American District Steam Co., No. Tonawanda, N. Y.
Armstrong Cork & Insulation Co., Pittsburgh, Pa.
Hornung, J. C., Chicago, Ill.
Johns-Manville, Inc., New York.
Pearce & Co., W. H., Chicago, Ill.
Ric-Wil Co., Cleveland, O.
Universal Gypsum Co., Chicago, Ill.
Wyckoff & Sons, A., Elmira, N. Y.

MANOMETERS.

American Schaeffer & Budenberg Corp., Brooklyn, N. Y.

MECHANICAL DRAFT APPARATUS.

American Blower Co., Detroit, Mich.
Buckeye Blower Co., Columbus, O.
Clarage Fan Co., Kalamazoo, Mich.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park Mass.
L. J. Wing Co., New York.

METERS.

Condensation.

American Dist. Steam Co., No. Tonawanda, N. Y.
Central Station Steam Co., Detroit, Mich.
Hornung, J. C., Chicago, Ill.
Pearce & Co., W. H., Chicago, Ill.

Feed Water.

Central Station Steam Co., Detroit, Mich.

Feed Water (Wier Type).

Webster & Co., Warren, Camden, N. J.

Flow

American District Steam Co., North Tonawanda, N. Y.
Spray Engineering Co., Boston, Mass.

Pitot Tube.

American Blower Co., Detroit, Mich.

Steam.

American District Steam Co., No. Tonawanda, N. Y.
Foxboro Co., Inc., The Foxboro, Mass.

MOTORS (Electric).

Sturtevant Co., B. F., Hyde Park, Mass.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

NIPPLE MACHINES.

Threading, Turning, Etc.

Bryant Sons & Co., O., Buffalo, N. Y.

NOZZLES, SPRAY

American Blower Co., Detroit, Mich.
Badger & Sons Co., E. B., Boston, Mass.
Bayley Manufacturing Co., Milwaukee, Wis.
Carrier Air Conditioning Co. of America, Buffalo, N. Y.
Carrier Engineering Co., Newark, N. J.
Clarage Fan Co., Kalamazoo, Mich.
New York Blower Co., Chicago, Ill.
Spray Engineering Co., Boston, Mass.
Sturtevant Co., B. F., Hyde Park, Mass.

OIL BURNERS

Aetna Automatic Burner Co., Providence, R. I.
American Nokol Co., Chicago, Ill.
Automatic Burner Corp., Chicago, Ill.
Combustion Fuel Oil Burner Co., Milwaukee, Wis.
Drying Systems, Inc., Chicago, Ill.
Hardinge Bros., Inc., Chicago, Ill.
Home Appliance Corp., St. Louis, Mo.
Ideal Rotary Burner Co., York, Pa.
Johnson Co., S. T., Oakland, Cal.
Marr Oil Heat Machine Cor., Minneapolis, Minn.
Rayfield Mfg. Co., Chicago, Ill.
Wilde Co., W. B., Peoria, Ill.
Winslow Boiler & Engineering Co., Chicago, Ill.

OZONE APPARATUS.

United States Ozone Co., Scottdale, Pa.

PIPE.

Cast Iron.

Clow & Sons, Jas. B., Chicago, Ill.

Steel.

National Tube Co., Pittsburgh, Pa.

Wood.

Wyckoff & Sons Co., A., Elmira, N. Y.

PIPE BENDING.

Badger & Sons Co., E. B., Boston, Mass.
Buffalo Forge Co., Buffalo, N. Y.
Grinnell Company, Providence, R. I.
National Pipe Bending Co., New Haven, Conn.
Whitlock Coil Pipe Co., Hartford, Conn.

PIPE CASING (Wood).

American District Steam Co., No. Tonawanda, N. Y.
Wyckoff & Sons Co., A., Elmira, N. Y.

PIPE HANGERS.

Grinnell Company, Providence, R. I.
Jenkins Bros., New York.

PIPE, POWER.

Grinnell Company, Providence, R. I.

PUMPS.

Centrifugal.

American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
Chicago Pump Co., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
Nash Engineering Co., So. Norwalk, Conn.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Wheeler Condenser & Engineering Co., Carteret, N. J.
Yeomans Bros. Co., Chicago, Ill.
Young Pump Co., Michigan City, Ind.

Condensation.

American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
Chicago Pump Co., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
Wright-Austin Co., Detroit, Mich.
Yeomans Bros. Co., Chicago, Ill.

Rotary.

Nash Engineering Co., So. Norwalk, Conn.

Steam.

American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
Nash Engineering Co., So. Norwalk, Conn.

Turbine.

Nash Engineering Co., So. Norwalk, Conn.
Wheeler Condenser & Engineering Co., Carteret, N. J.
Yoemans Bros., Chicago, Ill.

Vacuum.

American Steam Pump Co., Battle Creek, Mich.
Bishop & Babcock Co., Cleveland, Ohio.
Chicago Pump Co., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Nash Engineering Co., So. Norwalk, Conn.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y.
Skidmore Corp., Chicago, Ill.
Trane Co., La Crosse, Wis.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
Yeomans Bros., Chicago, Ill.
Young Pump Co., Michigan City, Ind.

RADIATOR HANGERS.

Frank Radiator Bracket Co., Chicago, Ill.
Gloeckle, Jr., A. F., Rochester, N. Y.
Grinnell Company, Providence, R. I.
Little Giant Mfg. Co., Minneapolis, Minn.
Hartmann Co., Charles, Brooklyn, N. Y.
Healy-Ruff Co., Minneapolis, Minn.
Pierce, Butler & Pierce Mfg. Co., New York.

RADIATOR MACHINERY.

Bryant Sons & Co., O., Buffalo, N. Y.

RADIATORS.

"Gasteam."

James B. Clow & Sons, Chicago, Ill.

"Gaswater."

Clow & Sons, Jas. B., Chicago, Ill.

RADIATORS, STEAM AND WATER.

Aerofin Corp., Newark, N. J.
American Radiator Co., Chicago, Ill.
International Heater Co., Utica, N. Y.
Gurney Heater Mfg. Co., Boston, Mass.
National Radiator Co., Johnstown, Pa.
Pierce, Butler & Pierce Mfg. Co., New York.
Standard Heater Co., Williamsport, Pa.
United States Radiator Corp., Detroit, Mich.

RECEIVERS.

Air.

American District Steam Co., No. Tonawanda, N. Y.
The Brownell Co., Dayton, Ohio.
Kieley & Mueller, Inc., New York.
Sterling Engineering Co., Milwaukee, Wis.

Condensation.

Chicago Pump Co., Chicago, Ill.
Davis Regulator Co., G. M., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Yeomans Bros., Chicago, Ill.

REGULATORS.

Boiler-Feed.

Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
McDonnell & Miller, Chicago, Ill.

Damper.

American Dist. Steam Co., No. Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
American Radiator Co., Chicago, Ill.
Bishop & Babcock Co., Cleveland, Ohio.
Davis Regulator Co., G. M., Chicago, Ill.
Fulton Co., Knoxville, Tenn.
Honeywell Heating Specialties Co., Wabash, Indiana.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Mueller Co., Decatur, Ill.
National Regulator Co., Chicago, Ill.
Nelson Corporation, Herman, Moline, Ill.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Powers Regulator Co., Chicago, Ill.
Simplex Heating Specialty Co., Inc., Lynchburgh, Va.
Sterling Engineering Co., Milwaukee, Wis.
Stickle Steam Specialties Co., Indianapolis, Ind.
Thrush & Co., H. A., Peru, Ind.
Trane Co., La Crosse, Wis.
L. J. Wing Mfg. Co., New York.

Pressure.

American District Steam Co., No. Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
Davis Regulator Co., G. M., Chicago, Ill.
Foxboro Co., Inc., The Foxboro, Mass.
Fulton Co., Knoxville, Tenn.
Honeywell Heating Specialties Co., Wabash, Indiana.
Hornung, J. C., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Klipfel Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Minneapolis Heat Regulator Co., Minneapolis, Minn.
National Regulator Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Stickle Steam Specialties Co., Indiapapolis, Ind
Thrush & Co., H. A., Peru, Ind.

Temperature.

American Radiator Co., Chicago, Ill.
Atlas Valve Co., Newark, N. J.
Bishop & Babcock Co., Cleveland, Ohio.
Carrier Engineering Corporation, Newark, N. J
Foxboro Co., Inc., The Foxboro, Mass.
Fulton Co., Knoxville, Tenn.
Gold Car Heating & Lighting Co., Brooklyn,
Honeywell Heating Specialties Co., Wabash, Indiana.
Hornung, J. C., Chicago, Ill.
Johnson Service Co., Milwaukee, Wis.
Kieley & Mueller, Inc., New York.
Klipfel Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Minneapolis Heat Regulator Co., Minneapolis, Minn.
National Regulator Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Sarco Co., New York.
White Mfg. Co., St. Paul, Minn.

SEPARATORS.

Oil.

Griscom-Russell Co., New York.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Stickle Steam Specialties Co., Indianapolis, Ind
Wright-Austin Co., Detroit, Mich.

Steam.

American District Steam Co., No. Tonawanda, N. Y.
Bishop & Babcock Co., Cleveland, Ohio.
Griscom-Russell Co., New York.
Illinois Engineering Co., Chicago, Ill
McAlear Mfg. Co., Chicago, Ill.
Patterson-Kelley Co., New York.
Sims Co., Erie, Pa.
Stickle Steam Specialties Co., Indianapolis, Ind
Webster & Co., Warren, Camden, N. J.
Wright-Austin Co., Detroit, Mich.

SPRAY COOLING SYSTEMS.

Bayley Mfg. Co., Milwaukee, Wis.
Cooling Tower Co., New York.
Massachusetts Blower Co., Watertown, Mass
Seymour, James M., Newark, N. J.

SPRAY NOZZLES

(See Nozzles, Spray)

STOKERS

CombustiKator Co., Chicago, Ill.

STRAINERS.

Oil.

Griscom-Russell Co., New York.
Kieley & Mueller, Inc., New York.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y

Steam.

American Dist. Steam Co., No. Tonawanda N. Y.
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Mason Regular Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Sarco Co., New York.
Sterling Engineering Co, Milwaukee, Wis.
Wright-Austin Co., Detroit, Mich.

Water.

American Dist. Steam Co., No. Tonawanda N. Y.
Davis Regulator Co., G. M., Chicago, Ill.
Griscom-Russell Co., New York.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Mason Regulator Co., Boston, Mass.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y
Sarco Co., New York.
Spray Engineering Co., Boston, Mass.

THERMOMETERS.

(Recording and Indicating).

American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bristol Co., Waterbury, Conn.
Foxboro Co., Inc., The Foxboro, Mass.
Powers Regulator Co., Chicago, Ill.
Sarco Co., New York.

Water.

Marsh & Co., Jas. P., Chicago, Ill.
Pierce, Butler & Pierce Mfg. Co., New York.

THERMOSTATS.

American Radiator Co., Chicago, Ill.
Atlas Valve Co., Newark, N. J.
Bishop & Babcock Co., Cleveland, Ohio.
Fulton Co., Knoxville, Tenn.
Gold Car Heating & Lighting Co., Brooklyn
Honeywell Heating Specialties Co., Wabash, Indiana.
Johnson Service Co., Milwaukee, Wis.
Klipfel Mfg. Co., Chicago, Ill.
Minneapolis Heat Regulator Co., Minneapolis Minn.
Powers Regulator Co., Chicago, Ill.

Pumps!

—a Chicago for every service

SPECIAL conditions to demand special types of pumping equipment. Whatever the conditions there is a Chicago designed to meet them. Sixteen years of successful service to every branch of industry supplying centrifugal pumping to meet every conceivable need is ample assurance of our ability to meet the exacting demands for efficient equipment for any job.

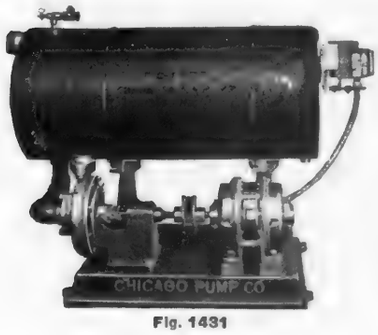


Fig. 1431

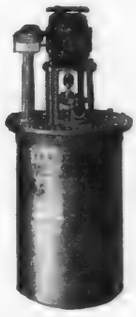


Fig. 1940

Figure No. 1431 shows the Float Control type Condensation Pump and Receiver designed to collect the return condensate from heating coils and pump them back to the boiler.

Figure No. 1940 illustrates the Vertical Condensation Pump and Receiver especially designed for use where the return lines are located below the floor level. This unit requires no pump pit and is adapted to ground installation.

Either of these units and other types of equipment may be had for capacities and boiler pressures to suit your job.

Would you like to have one of our engineers call upon you and explain the advantages of proper designed equipment for the job, or shall we send our descriptive bulletins? Just write.

Chicago Pump Company

Manufacturers of Quality Centrifugal Pumps For Every Service

2325 Wolfram Street Chicago, Ill.

BILGE SEWAGE VACUUM

CONDENSATION FIRE CIRCULATING

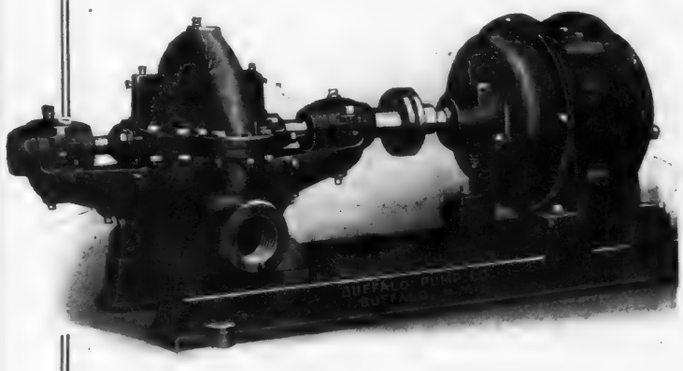
"Chicago" Pumps

"Buffalo" Class "S" Pumps stay on the job

Air washer manufacturers and heating contractors use more Buffalo Class "S" pumps than any other make.

This is because they have found Buffalo Pumps "long-lived" as well as efficient.

This popularity has enabled us to reach a production large enough to make the price of Class "S" pumps surprisingly low.



1. **Casing: Horizontally divided; mounted directly on base. Interior can be inspected without breaking pipe connections.**
2. **Impeller: Enclosed double suction type, hydraulically balanced.**
3. **Clearance Rings: Brass. Furnished in casing. Easily renewable.**
4. **Shaft Bearings: Ring oiling, horizontally split housings. Brackets bolted to casing, one on each side.**
5. **Thrust Bearings: Collars in each bearing of smaller pumps, marine type on larger sizes.**
6. **Stuffing Boxes: Extra deep. Brass bushed in smaller sizes.**
7. **Glands: Bolted type.**
8. **Water Seals: Brass. Furnished in each stuffing box. Connections cast in casing in smaller sizes.**

We are glad to have you compare specifications of Buffalo Pumps with any others.

Bulletins on request.

Buffalo Steam Pump Company

480 Broadway BUFFALO, N. Y.

In Canada:—Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

ENGINEERS' SPECIFICATION INDEX (Continued)

Sarco Co., New York.
Thrush & Co., H. A., Peru, Ind.
White Mfg. Co., St. Paul, Minn.

TRAPS.

Radiator.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Co., Cleveland, Ohio.
Cashin Co., W. D. Boston, Mass.
Dunham, C. A., Co., Chicago, Ill.
Hoffman Specialty Co., New York.
Ideal Heating Equipment Co., Cleveland, Ohio.
Illinois Engineering Co., Chicago, Ill.
Johns-Manville, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Mouat Vapor Heating Co., Cleveland, O
Nelson Corporation, Herman, Moline, Ill.
O-E Specialty Co., Milwaukee, Wis.
Sarco Co., New York.
Sterling Engineering Co., Milwaukee, Wis.
Stickle Steam Specialties Co., Indianapolis, Ind.
Trane Co., La Crosse, Wis.
Webster & Co., Warren, Camden, N. J.

Return.
American Blower Co., Detroit, Mich.
Barnes & Jones, Boston, Mass.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago Ill.
Johns-Manville, Inc., New York.
Kieley & Mueller, Inc., New York.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Mount Vapor Heating Co., Cleveland, O.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Simplex Heating Specialty Co., Inc., Lynchburgh, Va.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., La Crosse, Wis.
Webster & Co., Warren, Camden, N. J.
Wright-Austin Co., Detroit, Mich.

Steam.
American Blower Co., Detroit, Mich.
American District Steam Co., No. Tonawanda, N. Y.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Barnes & Jones, Boston, Mass.
Davis Engineering Co., New York.
Davis Regulator Co., G. M., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Johns-Manville, Inc., New York.
Kieley & Mueller, Inc., New York.
Klipfel Mfg. Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Patterson-Kelley Co., New York.
Pearce & Co., W. H., Chicago, Ill.
Sarco Co., New York.
Stickle Steam Specialties Co., Indianapolis, Ind.
Trane Co., La Crosse, Wis.
Wright-Austin Co., Detroit, Mich.

Vacuum.
American Blower Co., Detroit, Mich.
Bishop & Babcock Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Pearce & Co., W. H., Chicago, Ill.
Sarco Co., New York.
Sterling Engineering Co., Milwaukee, Wis.
Stickle Steam Specialties Co., Indianapolis, Ind.
Webster & Co., Warren, Camden, N. J.
Wright-Austin Co., Detroit, Mich.

TURBINES (Steam).

Buffalo Forge Co., Buffalo, N. Y.
Sturtevant Co., B. F., Hyde Park, Mass.
Westinghouse Elec. & Mfg. Co. East Pittsburgh, Pa.
L. J. Wing Mfg. Co., New York.

TURBO-BLOWERS.

Sturtevant Co., B. F., Hyde Park, Mass.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

UNDERGROUND PIPE CONDUITS.

American District Steam Co., No. Tonawanda, N. Y.
Hornung, P. C., Chicago, Ill.
Johns-Manville, Inc., New York
Pearce & Co., W. H., Chicago, Ill.
Ric-Wil Co., Cleveland, O.
Wyckoff & Son, A., Elmira, N Y

VACUUM CLEANING APPARATUS.

American Radiator Co., Chicago, Ill.
Spencer Turbine Co., Hartford, Conn.
Sturtevant Co., B. F., Hyde Park, Mass.

VALVES.

Air (Automatic).
American Radiator Co., Chicago, Ill.
Commonwealth Brass Corporation, Detroit, Mich.
Fulton Co., Knoxville, Tenn.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Jenkins Bros., New York.
Kelly Brass Works, Chicago, Ill.
Klipfel Mfg. Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Powers Regulator Co., Chicago, Ill.
Pierce, Butler & Pierce Corp., New York.

Air Relief.
American District Steam Co., No. Tonawanda, N. Y.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Barnes & Jones, Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Fulton Co., Knoxville, Tenn.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
O-E Specialty Co., Milwaukee, Wis.
Powell Co., Wm., Cincinnati, O.
Scott Valve Mfg. Co., Detroit, Mich.
Sterling Engineering Co., Milwaukee, Wis.
Webster & Co., Warren, Camden, N. J.

Back Pressure.
Griscom-Russell Co., New York.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
Klipfel Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Scott Valve Mfg. Co., Detroit, Mich.
Stickle Steam Specialties Co., Indianapolis, Ind.

Balanced.
American District Steam Co., No. Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
Davis Regulator Co., G. M., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Klipfel Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Scott Valve Mfg. Co., Detroit, Mich.
Stickle Steam Specialties Co., Indianapolis, Ind.

Blow-off.
Jenkins Bros., New York.
The Wm. Powell Co., Cincinnati, O.

Check.
Grinnell Company, Providence, R. I.
Jenkins Bros., New York.
Kennedy Valve Mfg. Co., Elmira, N. Y.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Powell Co., Wm., Cincinnati, O.
Scott Valve Mfg. Co., Detroit, Mich.

Float.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Atlas Valve Co., Newark, N. J.
Davis Regulator Co., G. M., Chicago, Ill.
Grinnell Company, Providence, R. I.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller Co., New York.
Klipfel Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Mason Regulator Co., Boston, Mass.
Stickle Steam Specialties Co., Indianapolis, Ind.

Gate.
American District Steam Co., No. Tonawanda, N. Y.
Grinnell Company, Providence, R. I.
Jenkins Bros., New York.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Marsh Valve Co., Erie, Pa.
Milwaukee Valve Co., Milwaukee, Wis.
Powell Co., Wm., Cincinnati, O.
Scott Valve Mfg. Co., Detroit, Mich.

Globe, Angle and Cross.
Commonwealth Brass Corp., Detroit, Mich.
Grinnell Company, Providence, R. I.
Jenkins Bros., New York.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Marsh Valve Co., Erie, Pa.
Milwaukee Valve Co., Milwaukee, Wis.
Pierce, Butler & Pierce Corp., New York.
Powell Co., Wm., Cincinnati, O.
Powers Regulator Co., Chicago, Ill.
Scott Valve Mfg. Co., Detroit, Mich.

Hydraulic-Operating.
Atlas Valve Co., Newark, N. J.
Kieley & Mueller, Inc., New York.
Klippel Mfg. Co., Chicago, Ill.

Non-Return.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Davis Regulator Co., G. M., Chicago, Ill.
Grinnell Company, Providence, R. I.
Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Powell Co., Wm., Cincinnati, O.

Radiator.
American Radiator Co., Chicago, Ill.
American District Steam Co., No. Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Co., Cleveland, Ohio.
Commonwealth Brass Corporation, Detroit, Mich.
Dunham Co., C. A., Chicago, Ill.
Fulton Co., Knoxville, Tenn.
Gorton & Lidgerwood Co., New York.
Honeywell Heating Specialties Co., Wabash, Indiana.
Ideal Heating Equip. Co., Cleveland, Ohio.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Kennedy Valve Mfg. Co., Elmira, N. Y.
McAlear Mfg. Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
Marsh Valve Co., Dunkirk, N. Y.
Milwaukee Valve Co., Milwaukee, Wis.
Powell Co., Wm., Cincinnati, O.
Powers Regulator Co., Chicago, Ill.
Trane Co., La Crosse, Wis.
Scott Valve Mfg. Co., Detroit, Mich.
Simplex Heating Specialty Co., Inc., Lynchburg, Pa.
Sterling Engineering Co., Milwaukee, Wis.
Stickle Steam Specialties Co., Indianapolis, Ind.
Webster & Co., Warren, Camden, N. J.

Reducing.
American District Steam Co., No. Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
Davis Regulator Co., G. M., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Johnson Service Co., Milwaukee, Wis.
Kennedy Valve Mfg. Co., Elmira, N. Y
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Mason Regulator Co., Boston, Mass.
Powell Co., Wm., Cincinnati, O.
Powers Regulator Co., Chicago, Ill.
Atlas Valve Co., Newark, N. J.

Regulating.
American District Steam Co., No. Tonawanda, N. Y.
Fulton Co., Knoxville, Tenn.
Hornung, J. C., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
Klipfel Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Powell Co., Wm., Cincinnati, O.
Powers Regulator Co., Chicago, Ill.

Relief (Water).
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
McAlear Mfg. Co., Chicago, Ill.
Powell Co., Wm., Cincinnati, Ohio.

Safety.
American District Steam Co., No. Tonawanda, N. Y.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Jenkins Bros., New York.
Powell Co., Wm., Cincinnati, O.

Stop and Check.
(See Valves, Non Return).

VENTILATING HEATERS

Portable Unit.
American Blower Co., Detroit, Mich.
Buckeye Blower Co., Columbus, Ohio.
Mueller Furnace Co., L. J., Milwaukee, Wis.
Nelson Corporation, Herman, Moline, Ill.
Nesbitt, John J., Inc., Atlantic City, N. J.
Pecco, Inc., St. Louis, Mo.
Peerless Unit Ventilating Co., New York.
Stickle Steam Specialties Co., Indianapolis, Ind.
Sturtevant Co., B. F., Hyde Park, Mass.
York Heating & Ventilating Co., Philadelphia, Pa
(See also Heaters, Portable Unit Air).

VENTILATING SYSTEMS

American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corporation, Newark, N. J
Clarage Fan Co., Kalamazoo, Mich.
Ilg Electric Ventilating Co., Chicago, Ill.
Massachusetts Blower Co., Watertown, Mass
Nelson Corporation, Herman, Moline, Ill.
Nesbitt, John J., Inc., Atlantic City, N. J.
New York Blower Co., Chicago, Ill.
Pecco, Inc., St. Louis, Mo.
Peerless Unit Ventilating Co., New York.
Seymour, James M., Newark, N. J.
Skinner Bros. Mfg. Co., St. Louis Mo.
Sturtevant Co., B. F., Hyde Park, Mass.
L. J. Wing Mfg Co., New York.
York Heating & Ventilating Co., Philadelphia, Pa

VENTILATORS.

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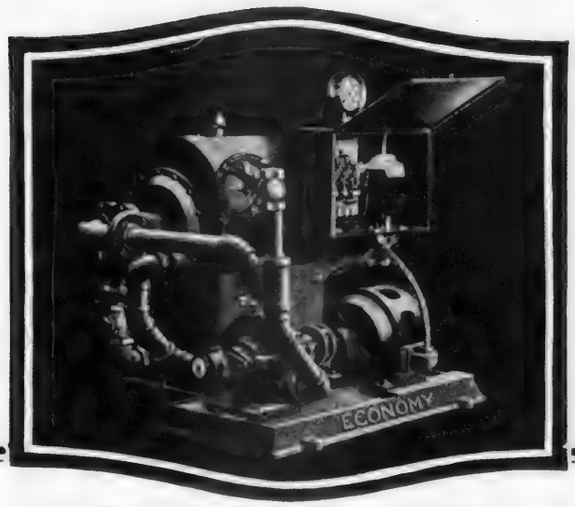
Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N. Y.
Ilg Electric Ventilating Co., Chicago, Ill.
New York Blower Co., Chicago, Ill.
Pecco, Inc., St. Louis, Mo.
Seymour, James M., Newark, N. J.
Sturtevant Co., B. F., Hyde Park, Mass.
L. J. Wing Mfg. Co., New York.
York Heating & Ventilating Co., Philadelphia, Pa.

Mushroom.
Aeolus Dickinson Co., Chicago, Ill.
Knowles Mushroom Ventilator Co., New York.
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Mass.

WEATHER STRIPS.

Metal.
Athey Company, Chicago, Ill.
Chamberlin Metal Weather Strip Co., Detroit, Mich.
Higgin Manufacturing Co., Newport, Ky.



Type C. V. Fig. 2234—Single Model Vacuum Pumps

DEPENDABILITY

This is an essential requirement of all apparatus entering into the equipment of every worth while project.

Economy Centrifugal Vacuum Pumps

embody every requisite of high class equipment. They are well motored with ample reserve power. They never burn out, consequently shut downs are avoided.

They have ample air, water and pressure capacity.

They have longer life than other types.

They maintain their efficiencies.

They are scientifically designed.

They have the best thought of competent hydraulic and heating engineers built into them.

They require less attention and upkeep than other types.

They reduce noise in radiators and piping.

They operate quietly.

They use no more power than other pumps that do the same work.

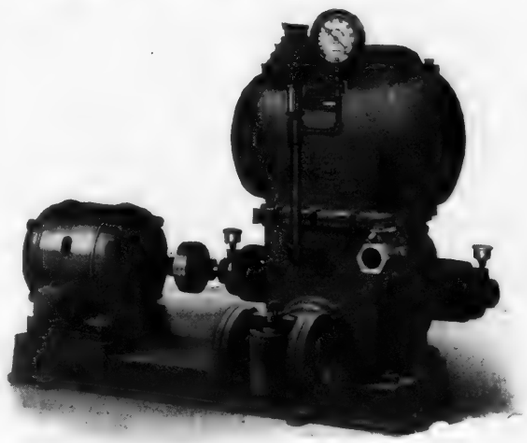
They are guaranteed for performance and quality.

Representatives in Every Large City

Economy Pumping Machinery Co.

71-122 North Curtis St. CHICAGO

SKIDMORE



The New Type "B"

THE Skidmore Hydro Turbine Vacuum and Boiler Feed Pump is now entering its fifth year.

Units that have been in service four heating seasons show the same efficiency that was shown when installed.

The new type offered retains all the advantages of those now in service, the change in design being in the casing to secure a more compact and sturdy unit.

All parts are of high grade cast iron or bronze, accurately machined.

There are no close clearances on moving parts and no piping is required to set the unit.

A self-contained unit all on one base.

Built in seven sizes for 10 to 60 lbs. pressure to handle 5,000, 8,000, 16,000, 26,000, 40,000, 65,000 and 100,000 sq. ft. of radiation for continuous service or with automatic control

SKIDMORE CORPORATION

General Offices and Factory

1535 Dayton St. CHICAGO, U. S. A.

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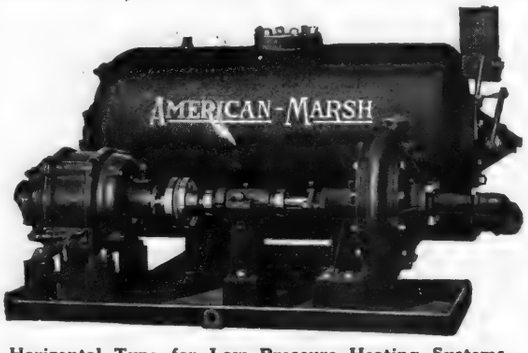
THIRTY-FIVE YEARS EXPERIENCE MAKES A DIFFERENCE



Horizontal Type for Low Pressure Heating Systems, Motor Driven.

AMERICAN-MARSH PUMPS

Simplex-Duplex Centrifugal

Condensation Pumps, steam and motor driven, vertical or horizontal.

A new type Condensation Pump giving day and night service.

Automatic Boiler Feed Pumps and Receivers.

Vacuum Pumps, steam and motor driven.

Hot Water Circulating Pumps.

Sump or Bilge Pumps.

Condensation Pumps

For Low Pressure Heating Systems

The present high efficiency of American-Marsh Condensation Pumps is the result of more than thirty-five years' experience in building pumps of all types.

We specialize in quality, for in quality lies the secret of service. When you purchase American-Marsh pumps you are buying service of the highest type.

Our Bulletin No. 27 will interest you; write for it today.

AMERICAN STEAM PUMP COMPANY

BATTLE CREEK, MICHIGAN

CHICAGO OFFICE: 1220 Monadnock Block **NEW YORK OFFICE: 17 Battery Place**

Gurney

Sectional Boilers
Steam and Water
900 Series

Additional Prime Heating Surface

During the long period of over 50 years in which Gurney Boilers have been made they have not only met the demands of the time, but, by constant effort toward the accomplishment of greater efficiency, our engineers have always been able to embody in Gurney Boilers certain exclusive features affording economy, convenience and better performance.

In the 900 Series Boilers one of the outstanding features is greater heating surface. This additional prime heating surface is effected by the water legs, as shown in the accompanying illustration.

Gurney Sectional Boilers are built of highest grade pig iron, give long and continuous service and embody many exclusive advantages. And there is a type for every requirement, from the residence to the large installation, requiring a battery of two or more boilers. **Send for catalog**

GURNEY HEATER M'F'G COMPANY.

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GURNEY HEATER CO., INC., New York, Manly St., Cor. Anable Ave. Long Island City

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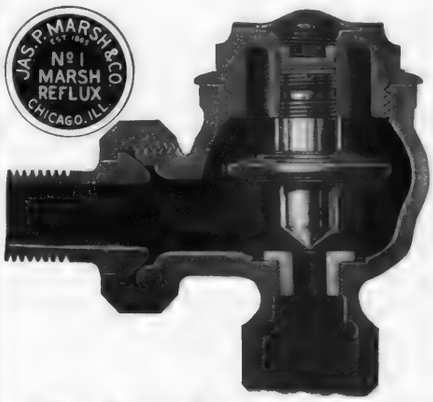
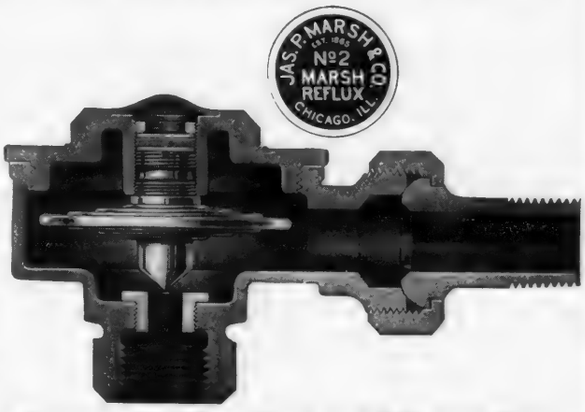
GURNEY HEATER CO., INC. Philadelphia, 108 North 17th Street

MARSH REFLUX THERMOSTATIC RADIATOR TRAPS



GUARANTEE ON EVERY TRAP

If any Marsh Reflux Trap might develop a defect in material, workmanship or operation inside of five years after date of installation, such Trap would be replaced free of charge.



The Most Economical, Practical and Efficient Trap for the Average Sized Unit

Marsh Reflux Traps assure full efficiency of Radiator Coil and System.

Automatically discharge air and the water of condensation as fast as it is formed.

The Trap closes the instant steam or vapor strikes the thermostatic diaphragm. Vapor or steam cannot pass through the Trap; therefore every atom of heat is given off in the radiator or coil.

Just one movable part—nothing loose to rattle, chatter or make a noise.

Neat in appearance, handsomely finished and heavily nickel-plated.

The Economical, Practical and Efficient Trap for Both Small and Large Units

Marsh Reflux Traps are all-metal construction including heavy cast brass body, handsomely nickel-plated and with extra heavy special tail piece.

The one movable part—a genuine phosphor bronze non-collapsible Thermostatic Diaphragm—contains the combination of volatile fluids so balanced as to, at all times, distinguish between air and water of condensation and vapor or steam. So corrugated and constructed to eliminate the slightest possibility of rupture from alternate expansion and contraction.

JAS P. MARSH & CO. 114-124 So. Clinton St. ESTABLISHED 1865 **Chicago**

61 YEARS CONTINUOUS EXPERIENCE IN MANUFACTURE OF STEAM SPECIALTIES

Manufacturers of Radiator Traps and Specialties—Automatic Air Valves and Vents—Indicating and Recording Gauges

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Agents for Dominion of Canada: Taylor-Forbes Co., Ltd., Guelph, Ontario.

SAN FRANCISCO

Nineteen Pacific Heated Schools—

Grant School, San Francisco—John Reid Jr., City Architect. Leland & Haley, Mechanical Engineers. A. Lettich, Heating Contractor. One 1100′ and one 2500′ Rear Fired Pacific Boiler.

Commodore Sloat School, San Francisco —John Reid Jr., City Architect. Leland & Haley Engineers. A Lettich, Heating Contractor. One 1550′ and one 3150′ Rear Fired Pacific Boiler.

Rear view of boilers showing rear firing oil burner attachment.

Front view of Pacific installation. Note compactness of this boiler. All flues cleaned from front so boiler may be set close to wall. Saves floor space.

In San Francisco, efficiency, low upkeep costs and long life combined with ease of operation and cleaning are the outstanding requirements for school heating plants.

That Pacific Boilers meet these exacting demands is clearly shown by the fact that 19 San Francisco school buildings are Pacific heated.

At the left are shown two of these schools. Installations are the standard, rear-fired oil burner type. Elements of combustion travel twice the length of the fire-box before entering lower bank of tubes; then twice the length of the boiler thru the tubes.

This four time fire travel enables Pacific Boilers to extract and utilize in generating steam practically every ounce of heat developed from the fuel.

Greater combustion space, longer fire travel and maximum direct heating surface — factors which make Pacific Boilers more efficient for San Francisco schools—make them better for all types of buildings. Let us send you complete information.

GENERAL BOILERS COMPANY
Waukegan, Illinois

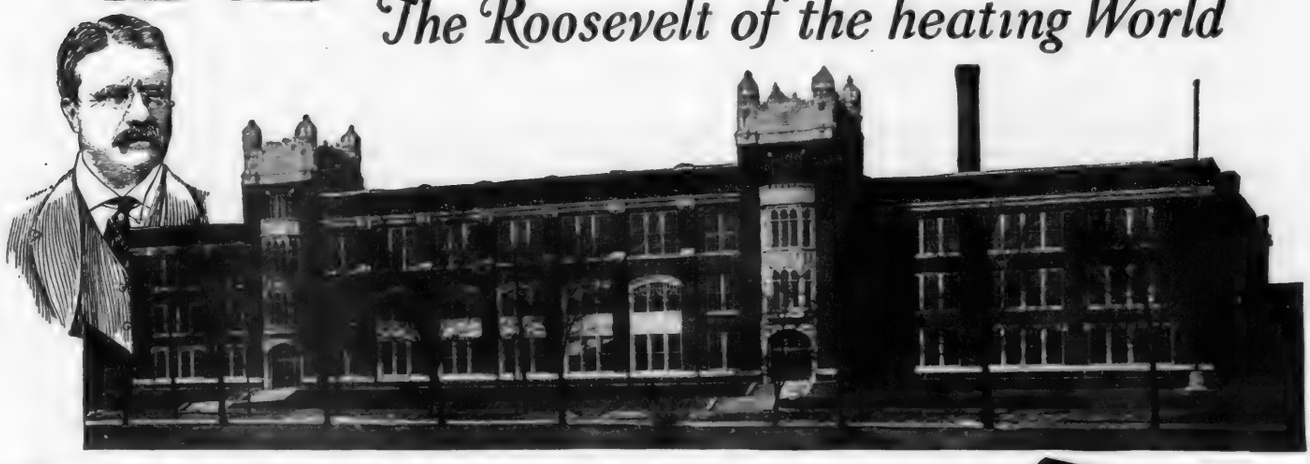
BRANCH OFFICES IN PRINCIPAL CITIES

TRADE MARK REG. U.S. PAT. OFF.
STEEL HEATING BOILERS
PACIFIC
WAUKEGAN ILLINOIS

PACIFIC
STEEL HEATING BOILERS

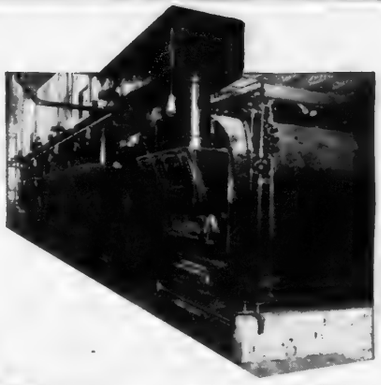
KEWANEE

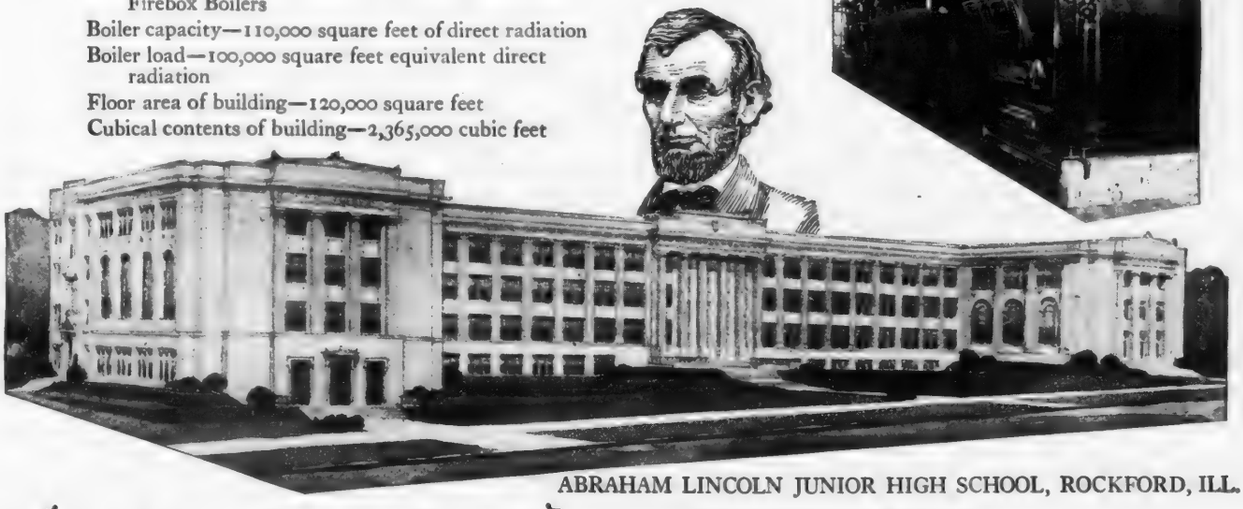
The Roosevelt of the heating World



THEODORE ROOSEVELT JUNIOR HIGH SCHOOL, ROCKFORD, ILL.
(WEST JUNIOR HIGH SCHOOL)

Architects—Peterson & Johnson
Heating contractors—Swords Brothers Co.
Four No. 323 and one No. 317 KEWANEE Smokeless Firebox Boilers
Boiler capacity—110,000 square feet of direct radiation
Boiler load—100,000 square feet equivalent direct radiation
Floor area of building—120,000 square feet
Cubical contents of building—2,365,000 cubic feet





ABRAHAM LINCOLN JUNIOR HIGH SCHOOL, ROCKFORD, ILL.

Architects—Peterson & Johnson
Heating contractors—American Heating & Supply Co.
Three No 324 and one No. 318 KEWANEE Smokeless Firebox Boilers
Boiler capacity—102,000 square feet of direct radiation
Boiler load—122,000 square feet equivalent direct radiation
Floor area of building—144,000 square feet
Cubical contents of building—2,800,000 cubic feet

In 14 fine Rockford Schools 25 KEWANEE BOILERS are used

Monuments like these great schools serve to perpetuate in memory characteristics of great men: the Ruggedness and Strength of Roosevelt, Lincoln's Honesty and Steadfast Purpose-by these qualities in kind is KEWANEE also kept well known

KEWANEE BOILER COMPANY

Head Office and Factory, Kewanee, Illinois—Branches in Principal Cities

Steel Heating Boilers, Radiators, Water Heaters, Tanks and Water Heating Garbage Burners

WHEN you install these dependable, efficient boilers, your customers are assured maximum comfort, convenience, and economy. For National Boilers require a minimum of attention, a relatively small amount of fuel, to deliver a gratifyingly large amount of even, healthful warmth.

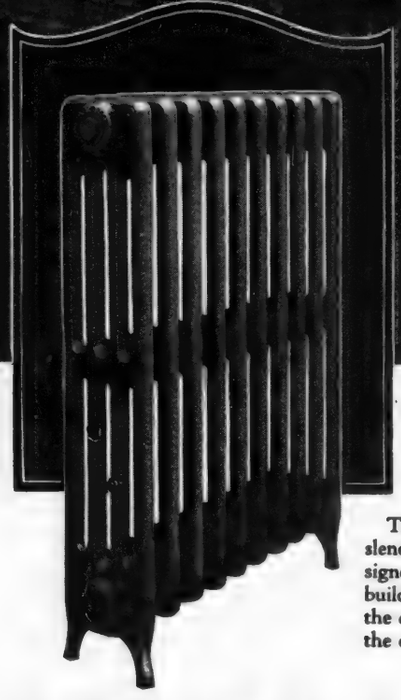
Literature and discount sheets are yours for the asking.

NATIONAL RADIATOR COMPANY

JOHNSTOWN, PA.

New York Philadelphia Baltimore Washington Richmond Pittsburgh Cincinnati Cleveland and Chicago

A National Novus Heater and Radium Gas Boiler connected in tandem which provides the utmost in heating comfort, convenience and efficiency, as either or both may be used as desired.



This is one of the beautiful, graceful, slender and efficient Aero Radiators designed to meet the modern trend in home building and decoration. It, like the rest of the complete line, sells at the same price as the old radiator types.

NATIONAL BOILERS

Library Bureau Bldg., Chicago. Heated with Kewanee Boilers equipped with WOLFF Draft Conditioners.

Wolff Draft Conditioners

Save Fuel—in fine buildings

No matter how fine a boiler a building has it needs a Wolff Draft Conditioner. For, by "conditioning" the draft, according to the temperature, Wolff Draft Conditioners make it possible to get the maximum efficiency from a boiler.

Installations in more than 5500 fine buildings in Chicago prove they are a money-saver for every big building, no matter what boiler it has. The proof is all contained in our big Red Book. We will be glad to send you a copy, or to show you actual installations where ***savings of 33% and more have been made.***

Sales Representatives

If you call on owners, contractors and architects, Wolff Draft Conditioners will "round out" your line and give you a profitable non-conflicting specialty, that can be sold on its merits.

Wolff Coal Saver Co.

1336 West Congress St. Chicago

"I have been selling them for some years and find them in all cases most satisfactory.

"Am using one in my own residence and appreciate the change in the annual coal bill. Now use ten tons of Buckwheat size anthracite fuel instead of the same quantity of Pea or Chestnut.

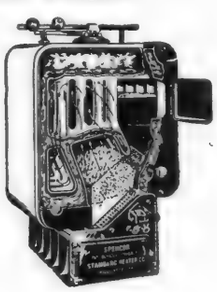
"I have made many installations of Spencers here and hope to make many more. I have been in the business here since March 1885. I cannot well afford to make serious errors in selecting goods to recommend, sell or install.

"Many expressions of regret are made to me at not having taken my advice to have Spencer Boilers installed instead of ones now in place,—against my recommendation.

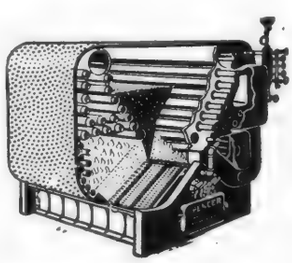
"The fuel problem, we all know, now is likely to be a continuous future problem. Those having a Spencer have no, or at least but little, trouble securing coal supplies." *

Another letter from a Pennsylvania heating contractor who finds Spencer Heaters not only profitable but highly satisfactory to sell, install and use.

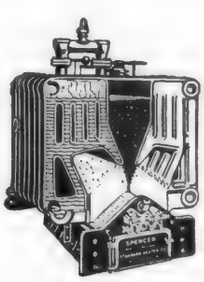
Name on request.



SPENCER
Single Grate Heater



SPENCER Steel Tubular Heater
for large installations



SPENCER
Double Grate Heater

* You can burn anything in a Spencer Heater that you can burn in any other heater and with equal success.

Spencer

steam, vapor or hot water

Heaters

burn No.1 Buckwheat coal

A size and type for every purpose *Sold only through heating contractors*

STANDARD HEATER COMPANY *General Offices:* WILLIAMSPORT, PA.

New York City Boston Philadelphia Baltimore Buffalo Rochester Hartford Washington Detroit Schenectady Syracuse Harrisburg Scranton

INTERNATIONAL HEATERS

ECONOMY SMOKELESS BOILERS

TEMPERATURE—MIXTURE—TIME! Two combustion chambers in which the gases are raised to a high temperature, mixed with air in the proper proportion, and *held* until they are consumed, prevent these smoky gases from going up the chimney, and help develop every possible pound of steam from every pound of coal.

That's why it is *smokeless*—and one reason why it is "*Economy*."

Among the 20 additional features of the International Economy Smokeless Boiler are these:

No header required—yet it gives *dry* steam,

Accurate air control—saving fuel,

Sufficient coal capacity—to develop full capacity for long periods and allow for rekindling,

No soot pockets—flues easily cleaned from front,

Very conservatively rated,

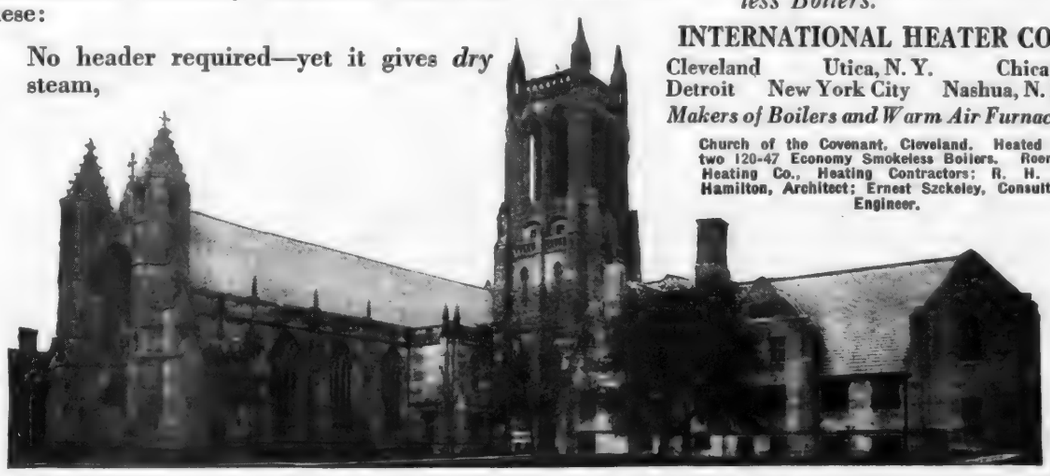
Backed by 85 years of heater experience.

Dealers and heating engineers are invited to send for catalog 1751-H which gives detailed specifications on International Economy Smokeless Boilers.

INTERNATIONAL HEATER CO.

Cleveland Utica, N. Y. Chicago
Detroit New York City Nashua, N. H.

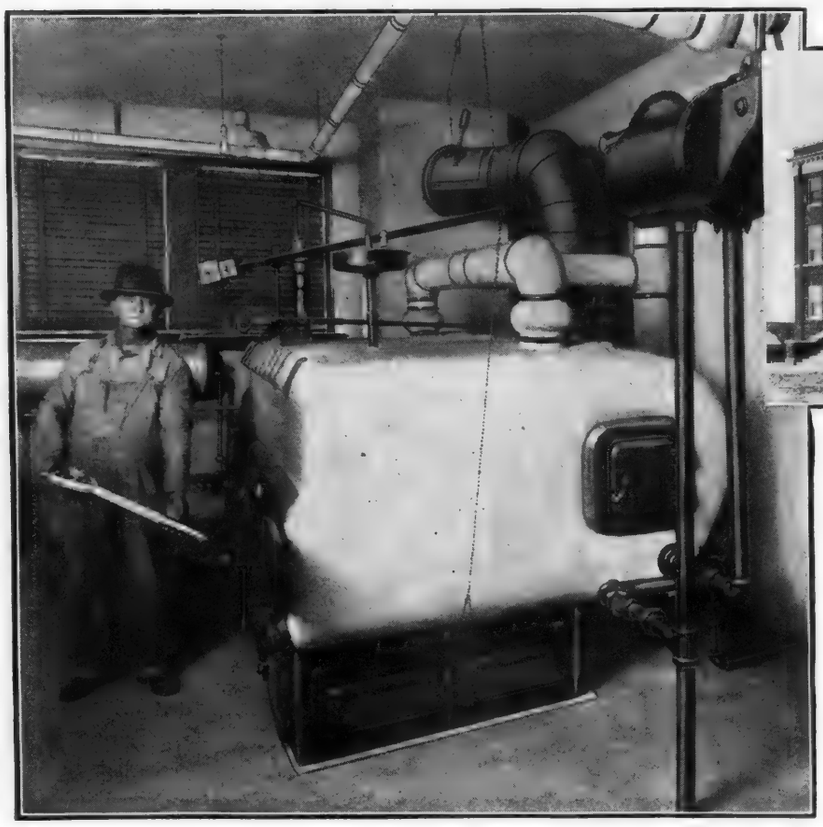
Makers of Boilers and Warm Air Furnaces



Church of the Covenant, Cleveland. Heated by two 120-47 Economy Smokeless Boilers. Roemer Heating Co., Heating Contractors; R. H. P. Hamilton, Architect; Ernest Szekely, Consulting Engineer.

Continental

BOILERS & RADIATORS



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Dallas, Texas
Heating Contractors
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One No. 411 Continental Low Water Line Boiler

Easy Firing and Better Heating With Continental Low Water Line Boilers

HEATING the County Court House at Quitman, Texas, is the job of a Continental Low Water Line Boiler. The verdict is that it pleases everybody from the fireman in the basement up to the judge on the bench.

Five reasons decided the choice in favor of the Continental, and here they are:

The low 43" and 47" water lines make Continentals easy to install in shallow basements.

Side feed and short grate bars make them easy to fire.

Water tubes in direct contact with the flames make them quick steamers.

They burn any kind of fuel smokelessly.

Thousands of them have met the tests of time and fire all over the world.

The story of Continental Boilers and Radiators tells why they are profitable to handle, reliable in performance, adapted to every requirement and backed by a broad and fair company policy. It's a story worth knowing—your name on the margin will bring it to you.

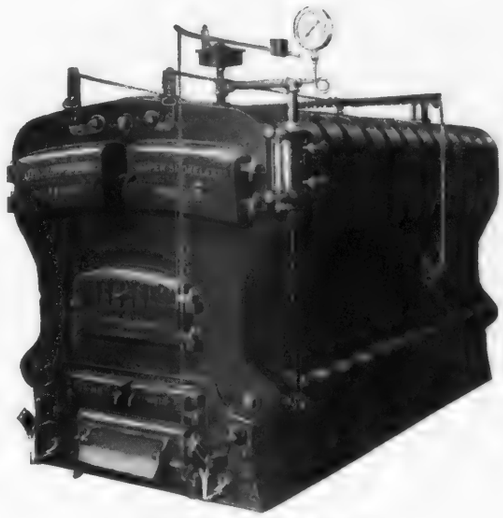
Continental Heater Corporation
Home Office and Factory
Dunkirk, N. Y. U.S.A.

BUILT FOR BETTER HEATING

ITALIAN EMBASSY, WASHINGTON, D. C.

Warren & Wetmore, *Architects* Standard Engineering Co., *Heating Contractors*

PROTECTED!



Exterior View of Boiler

UTICA Imperial SUPER-SMOKELESS Boilers are a protection against any fuel emergency. They will burn even the cheapest grades of soft coal without smoke and with great economy and efficiency. They have proved remarkably well adaptable for oil-burning and will utilize successfully hard coal or coke—thus protecting their owners against any fuel emergency! The recent fuel strike emphasizes the desirability of a boiler which will utilize the cheapest available fuel.

UTICA—IMPERIAL

SUPER-SMOKELESS-BOILERS

Manufactured by the

UTICA HEATER COMPANY, UTICA, N. Y.

Sales Offices in the Principal Cities

"RICHMOND" Boilers & Radiators ANN

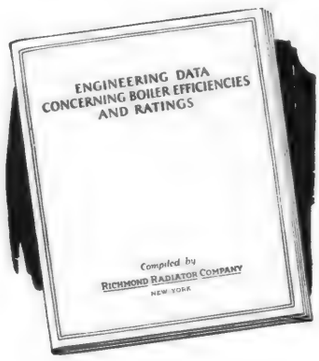
A NEW POLICY OF BOILER RATING

The Ratings of all Richmond and Model Boilers are now expressed in terms of Boiler Output, that is, the actual radiation that each Boiler will carry in addition to piping.

Here is the first big step forward in clearing the haze which surrounds boiler ratings. It lifts a weight of guess work responsibility from the shoulders of architect, engineer and heating contractor. It throws the bugaboo "factor of safety" into the discard because that factor of safety is needed in heating only where definite, positive facts are lost in a maze of qualifying conditions.

Guaranteed Ratings mean nothing unless the method by which these ratings were arrived at is known—how tested—by whom tested—by what Code—by what formula rated.

These data are now available on all Richmond Boilers and are based upon the following:



Engineering Data Concerning Boiler Efficiencies and Ratings

This is the title of a new booklet that every Engineer, Architect and Contractor should have for reference purposes. A postcard, a note, or the coupon below will bring your copy. Write today.

BUILT according to Code of American Society Mechanical Engineers.

TESTED according to Code of American Society of Heating & Ventilating Engineers.

RATED according to Code of Heating & Piping Contractors National Association.

CERTIFICATION of efficiencies and ratings by Robinson V. Frost, C. E. Norristown, Pa., member A. S. M. E. and A. S. H. & V. E., also S. E. Dibble, President (1925) A. S. H. & V. E. and Professor of Heating and Ventilating of Carnegie Institute of Technology, Pittsburgh, Pa.—boilers were tested in the Research laboratories of Carnegie Institute, Pittsburgh, Pa. and R. V. Frost, Norristown, Pa.

RICHMOND RADIATOR COMPANY,
1480 Broadway, N. Y.

Please send copy of the new Data booklet and facts concerning the new Richmond De Luxe.

Name .....

Address .....

City ..... State .....

H. & V.

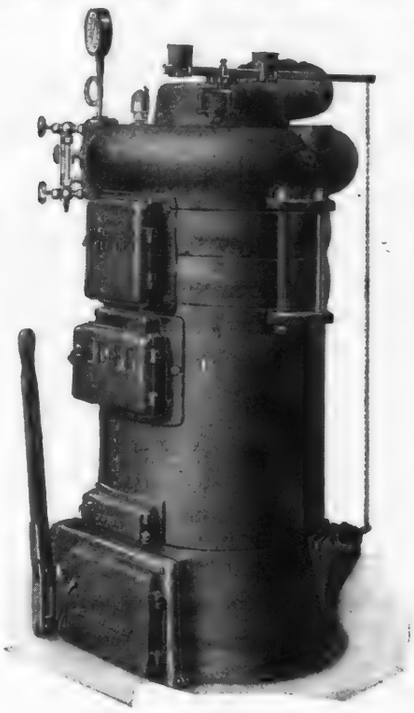
OUNCING

The De Luxe

A New "RICHMOND"

ROUND BOILER

TWO INTERMEDIATE SECTIONS assembled to show fire travel baffle. Six to eight in place of single flue opening, increasing heating surface 25% and dividing water into many small channels.



STEAM DOME deep, wide, under surface corrugated, increasing heating surface over 25%; four instead of a single flue opening; has two outlets; water column cast integral.

A CODE BOILER

The Richmond De Luxe brings every approved feature of boiler construction to a new level of perfection. It has greater heating surface, and greater efficiency than any other boiler of equal diameter and number of sections. In addition it offers exclusive features which are destined soon to be universally recognized as standard. Constructed, tested and rated according to the best accepted and unbiased codes—this boiler offers you a certified and unquestioned heating capacity that places it definitely far ahead of any other boiler made today, yet it costs no more than others. Available for Steam or Hot Water in 15 sizes.

Send the coupon for full details and also a new booklet that every Engineer, Architect and Contractor should have in his library, "Engineering Data on Boiler Efficiencies and Ratings."

RICHMOND RADIATOR COMPANY

1480 Broadway, New York, N. Y.

CHICAGO BOSTON HARRISBURG CLEVELAND PHILADELPHIA

Richmond Radiators and Richmond Model Boilers may be obtained from jobbers everywhere.

A Remarkable Instance Of High Pressure Hot Water Supplying

ONE of the Schrafft's Luncheon places in Brooklyn, at their noonday peak, required 2000 gallons of water at a temperature of 172 degrees. A Burnham W-27-10 Sectional High Pressure Water Supply Boiler was connected to an 1100 gallon tank.

In actual use it was found that their peak requirement was greatly in excess of 1100 gallons.

So much so, in fact, that it meant the boiler was called on to render practically an instantaneous supply. This it did with but a two degree lower temperature.

A second tank is to be installed, giving a storage capacity which will fully take care of the extra peak load at the desired 172 degrees.

We shall be glad to send you further facts about this High Pressure Water Supply Burnham.

BURNHAM BOILER CORPORATION

Irvington, N. Y.

New York Office: 30 East 42nd Street

Representatives In All Principal Cities

Canadian Offices: Harbor Comm. Bldg., Toronto 124 Stanley St., Montreal

Costs Less On Every Count

Economy and satisfactory heating service—these are the two main factors that have led so many engineers and plant owners to specify the Mueller Direct-Fired Forced Air Unit for industrial heating, instead of an elaborate steam or hot water system.

Both installation and operating costs are lower. It requires no radiation. Burns low grade fuel. No danger of freezing, breakages or shut-downs. No licensed engineer is needed to run it. Forced circulation of healthful, moist, warm air throughout the plant increases efficiency of workmen.

A positive circulating system for peak loads and quick heating periods is combined with a gravity system for night operation or when building is unoccupied. The Mueller Forced Air Unit may be operated singly or in batteries, to obtain a satisfactory temperature.

Write for descriptive literature. Our Engineering Department will gladly confer with you regarding your heating requirements.

L. J. MUELLER FURNACE COMPANY

267 Reed St. Established 1857 **MILWAUKEE, WIS.**

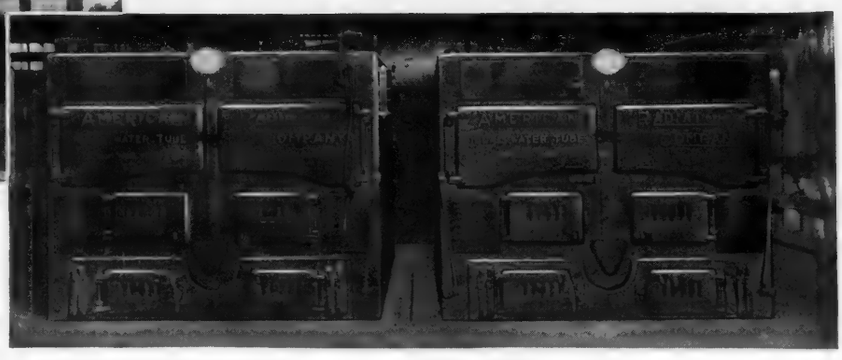
BRANCH OFFICES:

Chicago, Detroit, St. Louis, St. Paul, Minneapolis, Ft. Collins, Colo., Salt Lake City, Seattle, Baltimore.

MUELLER

• Direct-Fired • Forced Air Unit

The most economical way to heat big buildings



Trust Company of New Jersey, Jersey City, N. J., warmed by two 79" IDEAL Water Tube Boilers

A battery of Ideal Boilers

EVERY YEAR more and more architects and heating engineers are learning that the real secret of heating economy for larger buildings is the installation of a battery of IDEAL Boilers.

A heating boiler is rarely called upon to operate at 100% of its heat-producing capacity. As a matter of fact, a boiler is obliged to function at only about 30% of its maximum heat-producing capacity during the major part of the season.

With a battery of IDEAL Boilers, only one boiler, or two, or more, need be employed during most of the heating year. When colder weather comes, the entire battery may be put into service. This means a real saving in labor and fuel.

The coupon below will bring you complete information on installation of batteries of IDEAL Boilers.

IDEAL Boilers are manufactured in sections so that they can be easily carried through the average door —are installed without tearing down of walls or ripping down of doors.

AMERICAN RADIATOR COMPANY

Showrooms and sales offices: New York, Boston, Providence, New Haven, Newark, Philadelphia, Baltimore, Washington, Richmond, Buffalo, Pittsburgh, Cleveland, Detroit, Cincinnati, Atlanta, Chicago, Milwaukee, Indianapolis, St. Louis, St. Paul, Minneapolis, Omaha, Kansas City, Denver, San Francisco, Los Angeles, Seattle, Toronto, London, Paris, Milan, Brussels, Berlin.

Makers of IDEAL BOILERS *and* AMERICAN RADIATORS *and other products for heating, ventilating and refrigeration.*

AMERICAN RADIATOR COMPANY

Direct Mail Advertising Dept. 124
1807 Elmwood Ave., Buffalo, N. Y.

GENTLEMEN: Please send me your booklet describing IDEAL Water Tube Boilers.

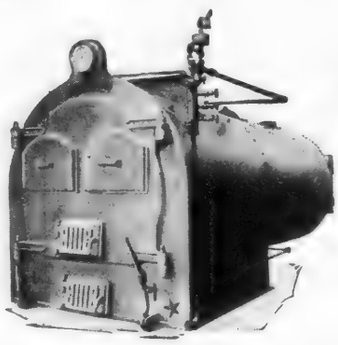
Name_____

Address_____

City_____ State_____

You need not wade through a mass of figures in buying the best boiler on the market!

Sizes 29 H.P. to 210 H.P.



Pressures 15 lbs. to 200 lbs.

Any practical man can easily understand the 17 points of superiority in the modern

Stanwood Smokeless Boiler

Every type boiler is weak at one or more of these points,—theories to the contrary. It's the practical application that shows them up.

Stanwood boilers have been designed to overcome these weaknesses,—those 17 points where expense is so easily piled up. In Stanwood boilers these 17 points are features of superiority. . . selling points for salesmen. . . demonstrable proof for hard headed buyers.

Measure all boilers by this Stanwood Standard!

1. Installation possible in 3 or 4 days.
2. Small space required for installation.
3. 45 to 77 inch water line.
4. No outside brickwork. . . minimum standard inside.
5. 70% efficiency where HRT shows 60%.
6. Down draft furnace for perfect combustion.
7. No air leaks.
8. Slight radiation loss.
9. Quick steaming.
10. Low stack temperatures.
11. Smokeless.
12. No stay bolts.
13. No crown sheet to bag.
14. No mud legs.
15. Easy to fire.
16. Easy to clean.
17. Rapid circulation.

THE STANWOOD CORPORATION
CINCINNATI
Established 1891

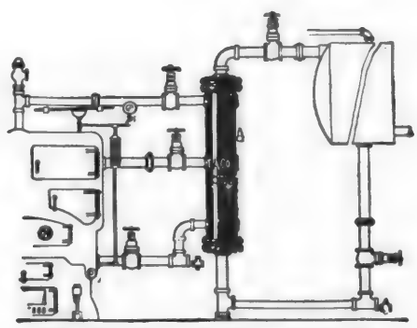
USE THIS COUPON ---------- Please send bulletins on low high pressure smokeless boilers to:

These bulletins have been prepared by one of America's foremost mechanical engineers and contain valuable information and advice.

TACO

SEMI-INDIRECT WATER HEATERS

1. **Two boiler connections below the water line, for heating at night and when the fire is banked, makes for economy.**
2. **One boiler connection above the water line insures quick heating with steam; also, compensates for inadequate storage tank capacity.**
3. **Being vertical, permits of positive circulation to tank, whether high or low.**
4. **Taco Semi-Indirect guarantees a satisfactory domestic hot water supply.**

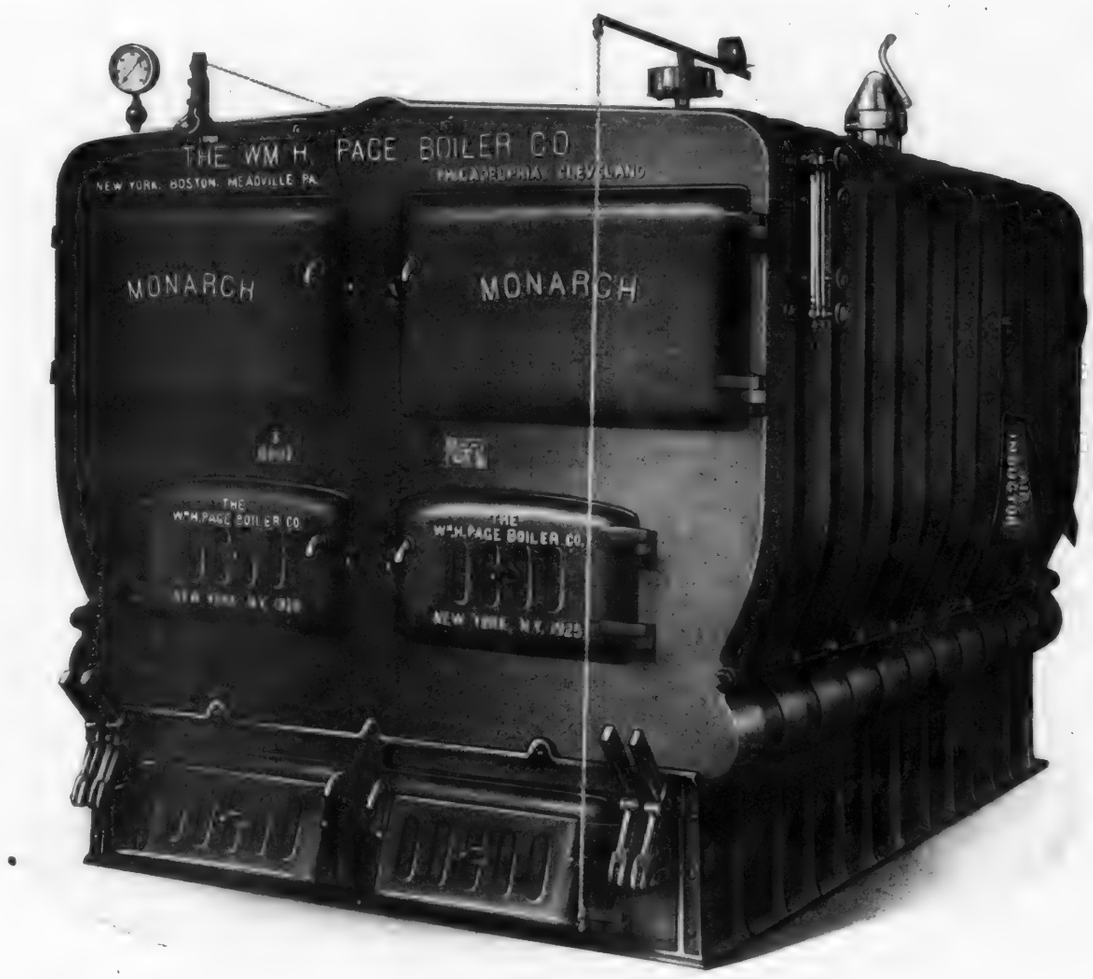


"It saves the cost of an extra fire"

Manufactured and Guaranteed by

Thermal Appliance Co.

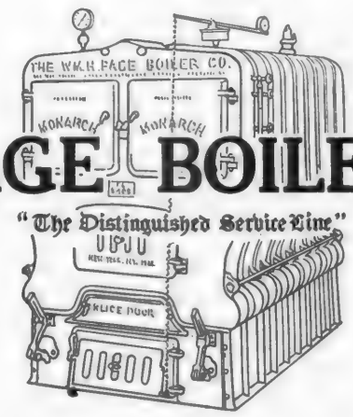
342 Madison Avenue **New York City**



Monarch 60″ Smokeless Boilers burn soft coal, without smoke.

Smoke is wasted fuel. With, or without, the auxiliary air inductor, Monarch boilers develop high efficiency when the fuel used is hard coal, coke or oil.

60 inch grate. 60″ water line. Long fire travel, on three levels. Monarch boilers are efficient under almost any working condition, burning any available fuel—and will fit into cramped and awkward boiler room areas.



PAGE BOILERS

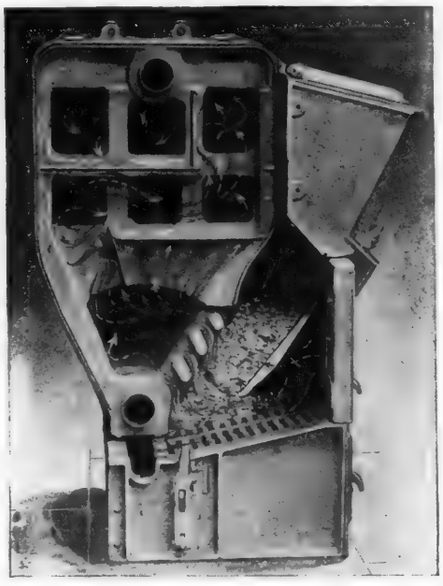
THE WM. H. PAGE BOILER CO.

200 Madison Avenue
NEW YORK

BOSTON **CLEVELAND**
PHILADELPHIA **MEADVILLE**

Established 1856 **Incorporated 1876**

Coal Bills Cut More than one-half



it burns No. 1 Buckwheat
needs coaling only once every 12 hours

	Monthly Coal Consumption with Old Boilers				Monthly Coal Consumption with Molby Boilers		
	tons				tons	No. 1	
456-8 Mott Ave.	5	Stove	Coal	$70.00	5	Buckwheat	$32.20
2351 Concourse	2½	"	"	35.00	2¼	"	14.40
2355 "	2	"	"	28.00	1½	"	9.60
2331 "	2	"	"	28.00	1½	"	9.60

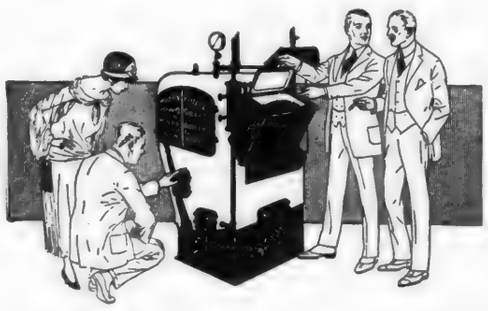
The above is from a recent letter to a New York heating contractor.

The New

MOLBY

Heating Boiler

Steam and vapor: 500 to 7750 sq. ft. Hot water: 850 to 12925 sq. ft.
Ask for catalog.



MOLBY BOILER COMPANY
Subsidiary of the Universal Pipe and Radiator Company
41 East 42nd Street, New York
Plant: Lansdale, Pa.

Thrush System of Hot Water Heating

THE SUCCESS with which Thrush System of Hot Water Heating has met is due to just three reasons:

First, the sound principle of the Thrush "closed" system makes heating more economical.

Second, the Thrush method of temperature regulation is dependable and convenient.

Third, its low cost, and the extreme simplicity of installation. Dealers like it.

H.A.THRUSH & CO.

Peru, Indiana.

SEND THIS COUPON

H. A. Thrush & Co., 19
Peru, Indiana.
Date

Please send us your new catalog with prices. We are interested in Thrush System of Hot Water heating.

Name

City

State

More *Profit!*

Titusville BOILERS

In this New Loft Building 247-263 West 37th. St., New York City.

TWO Titusville Tico "161" heating boilers because of their very satisfactory performance in many other New York Loft Buildings were installed in the new modern loft building just completed at 247-263 W. 37th St., New York. The Bricken Construction Co. are the owners and builders, L. G. Kirk Co. supervised the heating. Gronenberg and Leuchtag were the architects.

The Titusville Boiler Catalog No. 85, will be sent on request

THE TITUSVILLE IRON WORKS COMPANY

TITUSVILLE, PENNA.

SALES OFFICES

New York 152 W. 42nd St. | Detroit, Mich. 833 Washington Blvd. Bldg. | Pittsburgh, Pa. Farmers Bank Bldg. | Washington, D. C. Woodward Bldg. | Buffalo, N. Y. Marine Trust Bldg. | Chicago, Ill. 1124 Harris Trust Bldg.

Dealers Wanted

An opportunity for the Heating Engineer

The "Electric Furnace Man"

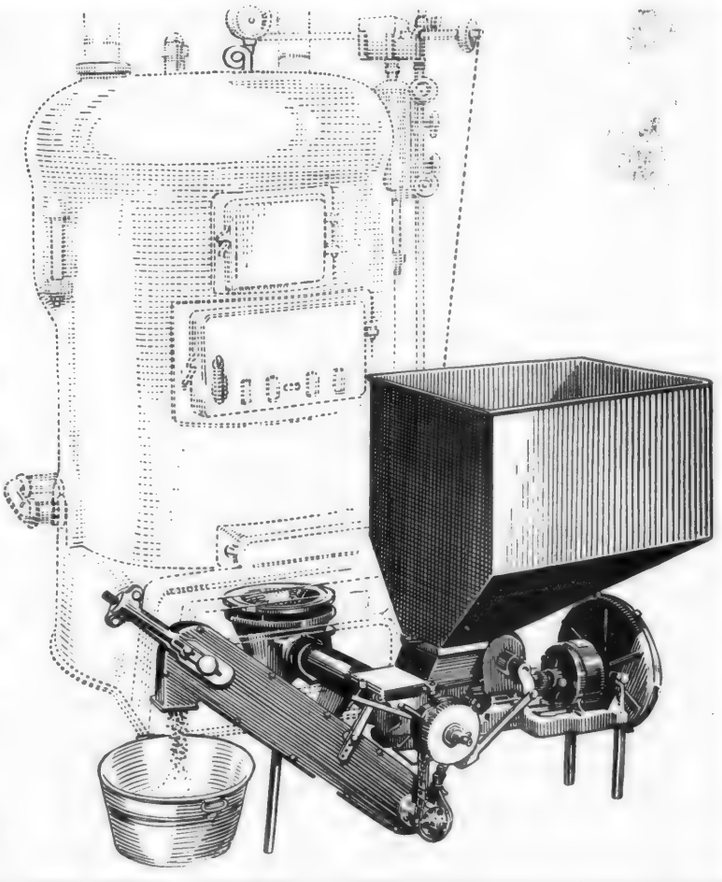
an automatic stoker—burns cheap coal—Buckwheat or Rice—puts coal on the fire—keeps fire burning—takes away ashes.

Operates electrically and is a time, money and labor saving device.

Can be installed easily and quickly in Hot Air Furnaces, Steam or Hot Water Boilers.

Some exclusive territory still available in the Eastern Anthracite Coal Burning District.

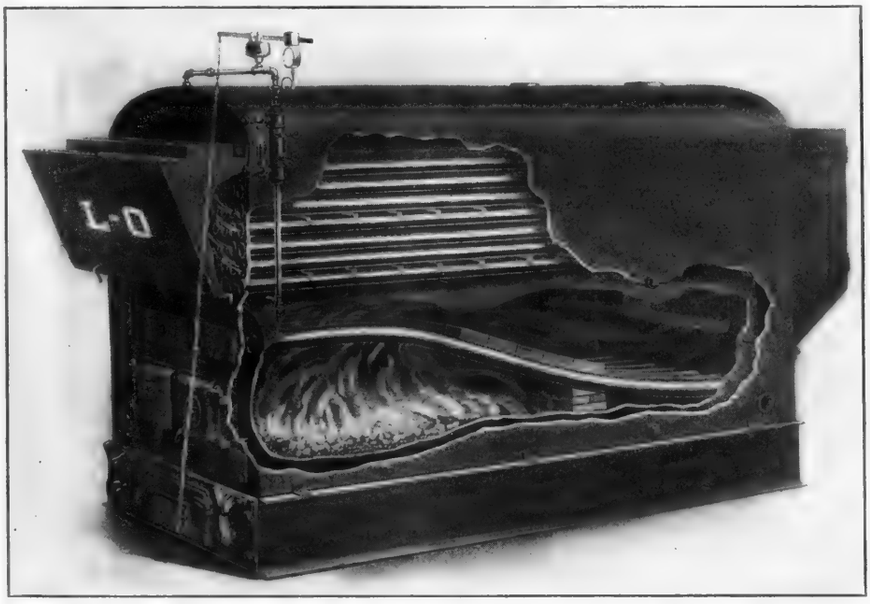
This is a real profitable business opportunity. Investigate now our agency proposition.



Domestic Stoker Co.

Seven Dey Street New York

LEBANON L-O BOILERS



Adaptability

(a) Fired at either end.

(b) Converted quickly for coal or oil fuel.

(c) Flue outlet at front or rear.

(d) Low and compact.

LEBANON BOILER WORKS

J. K. PETTY & CO., Inc., Proprietors

PHILADELPHIA OFFICE
507 Harrison Bldg.
(15th & Market Sts.)

Main Office and Works
LEBANON, PA.

Koithan & Pryor, Representatives
39 Cortlandt St., NEW YORK CITY

Representatives in Principal Cities

Why ROSS Steel Boilers are so often selected

Ross Steel Boilers are built strictly in accordance with the requirements of the American Society of Mechanical Engineers' Boiler Code.

Heavy Steel plates are used in their construction. These are electrically welded together making them practically a one-piece boiler with no joints or sections to leak.

New features are incorporated in their design, placing them far in advance of the ordinary fire-box type of boiler.

Unequaled economy is obtained by the scientific arrangement of heating surfaces correctly proportioned for the utmost in heat absorption, resulting in extremely low chimney temperatures.

Smokeless conditions are the result of form and accurate proportions of combustion spaces and grate surfaces which insure proper combustion of gases under usual operating conditions.

The design is especially adapted for the use of oil which can be burned with the highest degree of efficiency.

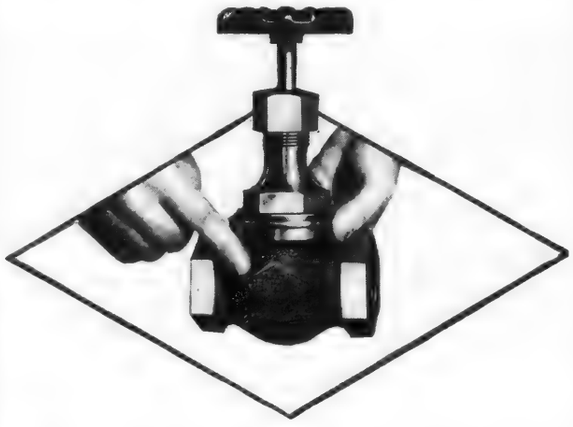
Made in a wide range of sizes. The satisfaction of the fortunate bungalow owner with the Ross No. One, is on a par with the proud operator of a battery of No. Thirties in a sky-scraper.

Manufactured and guaranteed by a Company with 75 years of experience in building boilers.

Write for Catalog

The Frost Manufacturing Co.

GALESBURG, ILLINOIS



This mark is all you need to see

The Jenkins "Diamond" is a sure sign of a valve that makes good in the service for which it is recommended. This mark guides the experienced heating and piping contractor in selecting valves that keep his good work at its best.

He knows what is back of the Diamond mark—an organization that has maintained the highest manufacturing standards for over sixty years.

Each Jenkins valve contains only analyses-proved metal uniformly distributed throughout the valve, but each before it leaves the Jenkins factory, passes a test which allows a wide safety margin.

JENKINS BROS.

80 White Street — New York, N. Y.
524 Atlantic Avenue — Boston, Mass.
133 No. Seventh Street — Philadelphia, Pa.
646 Washington Boulevard — Chicago, Ill.

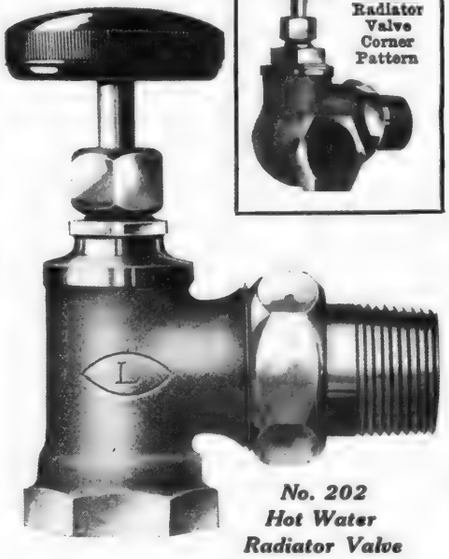
JENKINS BROS., LIMITED
Montreal, Canada — London, England

Always marked with the "Diamond"
Jenkins Valves
SINCE 1864

A LINE of high grade radiator valves in a complete range of styles and sizes, suitable for every type of steam or hot water heating installation.

Your Jobber Can Supply You

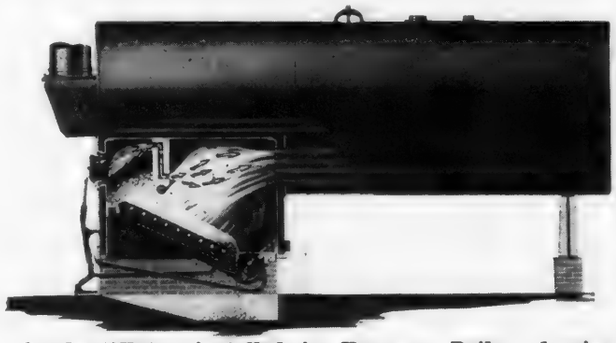
Manufactured by
Commonwealth Brass Corporation
DETROIT



No. 202 Hot Water Radiator Valve

COMMONWEALTH
LAVIGNE
Radiator Valves

THE CombustiKator ELIMINATES



CombustiKator installed in Kewanee Boiler showing simplicity of the CombustiKator, together with refractory hopper, coking chamber, etc.

ALL CLEANING OF FIRES

—an immense forward stride

The **CombustiKator** provides the fundamental requirements for burning coal.

The CombustiKator has achieved a simplicity hitherto never dreamed of and an efficiency approached only by the most expensive equipment. It is acclaimed the solution of the coal-burning problem. The human element is no longer a controlling factor in determining economy through skill or waste through carelessness and ignorance.

The **CombustiKator** fulfills all theoretical requirements for complete combustion. It meets every boiler-room requirement — fool-proof, simple and dependable.

All the advantages of gas producer and mechanical stoker without their drawbacks, are combined in the **CombustiKator.** Coal is "coked" before being admitted to the furnace chamber proper. The valuable volatile gases are driven off, pre-heated and completely burned—so eliminating smoke and increasing efficiency. Cleaning of fires is absolutely eliminated through the method of coking, the method of advancing the fuel down the fuel bed and freedom from agitation of the incandescent mass.

The **CombustiKator** meets the most rigid smoke ordinances. It is able to burn the cheaper grades of coal. It is no longer necessary to use costly lump; for the smaller and cheaper sizes give better results. It is no longer necessary to employ skilled labor—anyone can operate the **CombustiKator**—it is so simple and fool-proof.

The **CombustiKator** is the answer of the coal industry to the challenge of the oil industry. Efficient at all loads, ready response to load changes, this simple coal burner makes it as easy to fire large boilers as small boilers.

> The **CombustiKator** can be quickly installed in all standard fire-box boilers, all return-tubular boilers and all horizontally baffled water-tube boilers.

Consulting Engineers: Send for information about the **CombustiKator,** and ask for proof of performance.

Contractors: Ask for complete details, together with plans for co-operation.

Only 3 Simple Operations

Each easy and fool-proof

1. **Throw coal against wall.**
2. **Pull on lever advances fuel over inclined bed, leveling, renewing, cleaning fuel bed and keeping it free from ash.**
3. **Release of lever discharges ash into ash pit.**

No skill required. No knowledge necessary. Mistakes are impossible. Nothing to think about. Nothing to go wrong.

Other CoKal Products

HAND FEED STOKERS
HOPPER FEED STOKERS
POWER FEED STOKERS

There is a size and type of CoKal Stoker for every size and type of boiler from 20 to 1000 H. P. and every type of coal.

The CombustiKator Company

Division of CoKal Stoker Corporation

1014 Wrigley Building, Chicago

Kansas City *New York City* *Philadelphia* *Pittsburgh* *St. Louis*

INSIDE HOPPER GRAVITY FEED

COKAL COMBUSTIKATOR

Reg. U. S. Patent Off.

CORRECT COAL BURNING ASSURED

EACH RADIATOR AN INDEPENDENT STEAM HEATING PLANT

A Heating System that can Vary with the Seasons

In changeable weather, and in spring and fall, the ups and downs of the ordinary heating system are most noticed. Either there is too much heat or too little no matter how expensive the heating system.

Clow Gasteam Radiators hooked into the standard system, and replacing some of the radiators in it, end all this.

When the heating plant is operating the Gasteam Radiators function as any other radiator.

When the heating plant is shut down at nights or in the spring and fall, the independent, gas fired Gasteam Radiator supplies steam heat when and where it is wanted.

The installation cost is negligible in comparison with the savings and convenience.

Clow Gasteam Radiators are supplied for either vacuum or vapor, either one or two pipe systems—also Clow Gaswater Radiators for hot water systems.

JAMES B. CLOW & SONS

201-299 N. Talman Ave., Chicago

Offices in Principal Cities

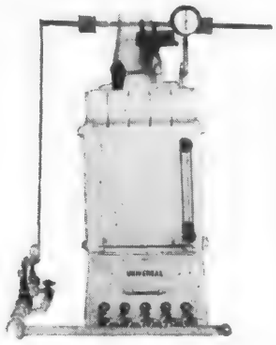
CLOW

GASTEAM — GASWATER

UNIVERSAL
Gas Boilers
Steam and Hot Water

will give years of satisfactory Heating Service

Thousands of these boilers in daily use.



Announcing our new model with a new and improved injector tube, burner, mixer, adjustable air shutter, etc. Furnished with or without metallic jacket, lined with "super firefelt."

IMPORTANT NOTICE TO OWNERS

The Universal has every square inch of heating surface easily accessible for cleaning. An exclusive feature.

Sizes and Specifications

With plain section			With special circulating steam section	
Number Steam P. S. Water P. W.	Steam Rating	Water Rating	Number T. S.	Steam Rating
31	300	480	31	380
41	400	665	41	480
51	550	905	51	660
61	700	1145	61	840
32	850	1385	32	1020
42	1000	1625	42	1200
52	1150	1865	52	1380
62	1300	2105	62	1560
72	1450	2345	72	1740
33	1600	2585	33	1920
43	1750	2825	43	2100
53	1900	3065	53	2280
63	2050	3305	63	2460
73	2200	3545	73	2640
34	2350	3785	34	2820
44	2500	4025	44	3000
54	2650	4265	54	3180
64	2800	4505	64	3360
74	2950	4745	74	3540
35	3100	4985	35	3720
45	3250	5225	45	3900
55	3400	5465	55	4080
65	3550	5705	65	4260
75	3700	5945	75	4440
36	3950	6185	36	4620
46	4100	6425	46	4800
56	4250	6665	56	4980
66	4400	6905	66	5160
76	4550	7145	76	5340

Other Sizes on Application

Universal Smokeless Boiler Co.

Ravenna, Ohio

No more radiators!

Trane Announces An Invention so Revolutionary that Its Far Reaching Effects on Modern Heating are Beyond Comprehension

INTRODUCTORY

What the Invention is

Stated simply and directly, the invention is a device that takes the place of radiators. In looks, weight, and principle, however, it is different from a radiator, and it is placed on the market as the successor to rather than the competitor of ordinary cast iron radiation. It is called the Trane Heat Cabinet, and heating plants using these cabinets are Cabinet Heating Systems.

(CONTINUED ON NEXT PAGE)

Revolutionary Features

Trane Heat Cabinets are such a basic invention that their features apply to *all* the accepted forms of direct radiator heating, such as hot water, steam, vapor and vacuum.

Among these features are—

ECONOMY OF FUEL. Heat Cabinets save 20-35% fuel. The reason for this saving is explained in the text that follows.

LIGHT WEIGHT. One radiator weighs as much as *ten* Heat Cabinets. In other words, enough Heat Cabinets to heat an ordinary house do not weigh any more than one radiator. Think what this means in freight saving.

LOW COST. Heat Cabinets, although their heat unit is constructed of brass and copper, do not cost any more than equivalent cast iron radiation.

SMALL SPACE. Heat Cabinets use less space than equivalent cast iron radiation, and much less space than radiators enclosed in shields.

BEAUTY. Heat Cabinets are furniture, and can be finished to match any surroundings. As far as appearance goes, they are somewhat comparable to radiator shields, but their cost is far below the shield-and-radiator combination.

INVISIBLE WHEN DESIRED. Heat Cabinets can be built into the walls, so that nothing is visible except the heat outlet.

TEMPERATURE CONTROL. Heat Cabinets give to all present forms of radiator heating, INCLUDING hot water systems, the feature of temperature control at each heat outlet—exact, and *instantaneous.*

QUICK HEAT. The heating of all present types of radiator systems is much faster, especially hot water systems, where heating is accelerated 300% to 400% by the use of Heat Cabinets.

PERMANENCE. Heat Cabinets are solid and rigid, with no joints or seams—as permanent as the piping.

Cabinet Heating—*The Heat of the Future*

In the home or other buildings where Cabinet Heating is used, you see no unsightly radiators. Heat Cabinets inconspicuously distributed, finished to match the furniture, are the only evidence that a heating system is installed.

(CONTINUED ON NEXT PAGE)

Looking at the Cabinets it is difficult or impossible to tell whether the building uses steam, hot water, vapor or vacuum. The function of any of these methods is but to supply heat to the unit in the Cabinet. From this point the great Cabinet Heating advantage of exact, instantaneous regulation starts—operating entirely independently of the basic system.

What the Heat Cabinet is and How it Works

The Trane Heat Cabinet, as the name implies, is a cabinet containing a heating element. This heating element is constructed in such a way that it gives heat readily by *convection*, but does not *radiate* heat.

In other words, the amount of heat given off by this heating element depends almost entirely upon the amount of air that is permitted to pass through it.

If the element is permitted to stand in still air, without circulation, it is practically at steam temperature (on a steam system) but it does not give up its heat.

As soon as the air around this heating element is allowed to circulate, heat is given up by the element very rapidly.

The result is similar to the case of stirring up a fire that has been banked.

Saves 20% of Fuel

Air passing through the Heater attains a velocity of about 200 feet per minute. This high velocity causes fast circulation of air in the room, and in less than ten minutes the Cabinet will completely change all the air in the room and heat it up to a comfortable temperature.

The important point to be remembered in connection with this rapid changing of air is that floor and ceiling temperatures are kept more nearly the same.

Exhaustive experiments have shown that 20-35% is saved in fuel where the floor and ceiling temperatures are nearly the same, instead of having a difference of 5 to 15 degrees between them, as is usually the case with a 38″ cast iron radiator.

Absolutely Perfect Heat Control

Since the heat given up by the Cabinet depends almost entirely upon the amount of air that passes through it, it naturally follows that by regulating the amount of air going through the Cabinet, YOU REGULATE THE AMOUNT OF HEAT GIVEN UP BY THE CABINET.

(CONTINUED ON NEXT PAGE)

The practical application of this wonderful feature means merely the use of a hand damper that extends the full length of the Heat Cabinet. By adjusting this damper the heat is regulated with a nicety that in the past has often been dreamed of but never successfully accomplished.

A Marvelous Thing

This exact, minute, instantaneous control is really a marvelous thing. Heating engineers have been attempting to secure such a result for the past forty years by making special supply valves which admit different amounts of heat into a radiator. This has never been very successful, and where successful at all it has given only a slow change in the amount of heat.

Hot Water Cabinet Heating

In a hot water radiator, if you shut off the valve partially you simply change the circulation a small amount. It is an hour or so before any appreciable change in room temperature is secured. With the Heat Cabinet, however, you get the change in heat *instantly*, either increase or decrease, as desired.

This change in heating effect is exactly the same whether you are considering hot water, straight steam, vapor, or vacuum.

No Freezing On a hot water Cabinet Heating System it is not necessary to keep the Cabinet on at night to prevent freezing. You simply shut off the air circulation damper and you thereby shut off the heat. The heating element itself, however, remains as hot as it ever gets, but since it is completely enclosed by the walls of the Cabinet and the damper, it is not giving off heat and is not causing the consumption of fuel.

Clean Heat The Heat Cabinet throws all the air out toward the front. The walls never become black due to air circulation, which is so common with radiator heating systems.

Tops to Taste The top of the Heat Cabinet is flat, and can be either a board or made of marble to suit any given interior decorations. No matter how many books or papers are put on top of the Heat Cabinet, there is no decrease in the amount of heat given off.

Quick Heat with Hot Water Hot water plants using Trane Heat Cabinets have entirely different characteristics than before. The fact that they have exact, instantaneous, individual Cabinet control has just been pointed out. In addition there are other outstanding features.

(CONTINUED ON NEXT PAGE)

The radiators of an ordinary hot water system contain nearly 60% of all the water in the entire plant. A 100-foot Trane Heat Cabinet, however, contains *less* than *one quart* of water. As a consequence, we have nearly 60% less water on a Cabinet type hot water system, and the heating-up of the plant is thereby accelerated nearly two and one-half times. In other words, if it takes a radiator type hot water plant one hour to heat up, a Cabinet type hot water plant of the same size and under identically the same conditions requires less than twenty minutes to accomplish the same result.

Steam Cabinet Heating

All straight steam installations are greatly improved in operation and their initial cost is reduced. By using the damper in the Cabinet, perfect heat control is given to the steam plant, and the most troublesome part of straight steam heating is overcome.

No Air Binding The heating element of a Trane Heat Cabinet contains but a single "U" shaped copper pipe, with copper fins, extending all the way across the Cabinet and back again. This construction positively eliminates air binding because there are no places for air pockets to form.

The single "U" shaped pipe in the Cabinet heats up as readily as the pipe which is part of the supply or return system of the plant. One of the greatest difficulties which has been constantly encountered in heating plants during the past fifty years, i. e., dead air spaces, is thus removed.

Easy to Move It is never a serious problem to remove a Heat Cabinet during the summer or during repair work in a building. The cabinet itself can be lifted from its place without disturbing piping connections, and if it is desired to move the heating element also, there are but two pipes to disconnect, and the element is easily handled by one person.

Vapor Cabinet Heating

On vapor heating installations there is a complete removal of air binding trouble. The steam supply coming in from the upper connection of the Trane "U" tube naturally has to force all air out of the tube before it can be filled with steam vapor.

The "U" tube, therefore, gives a much more perfect relief of air on all vapor heating systems, and the ideal heat control that has been sought for years is supplied by the damper in the Cabinet.

(CONTINUED ON NEXT PAGE)

A Joy to Architects

Architects are given a long sought freedom in interior room decorations. Trane Heat Cabinets can be installed in the walls and enclosed to meet any artistic requirements. They can be installed under windows so that the top of the Cabinet is part of the window sill, and can be finished with the same material as the other sills.

Where it is desired for any reason to keep the heating equipment entirely concealed, Trane Heat Cabinets can be built into the walls with nothing but the outlet visible. It is important to note that Trane Heat Cabinets have the same high efficiency whether visible or invisible.

There is no serious disadvantage to installing Heat Cabinets on the inside walls. The rapid circulation of the air from the Cabinet overcomes the poor circulation and poor distribution of heat which is always present with ordinary cast iron radiators when used on interior walls.

Heat Cabinets can also be installed between joists in the basement, with proper provision for cold air and hot air to be delivered to the room above.

Details, Literature and Data

Complete details on Trane Heat Cabinets will be supplied on request, including test data where desired, and information regarding roughing-in dimensions, etc.

No Secret

There is no secret about the internal construction of Trane Heat Cabinets, and all questions from interested persons will gladly be answered.

Name Not Registered

Trane is not making any claim on the names "Heat Cabinets" or "Cabinet Heating." These descriptive terms apply to this fundamental change in modern heating art, and, like the Cabinets themselves, are for all to use and enjoy.

Address all communications to

REUBEN N. TRANE

c/o The Trane Company

La Crosse, Wisconsin, U. S. A.

INVESTIGATE
Gas House Heating!

Are you prepared to get your share of profitable business in this rapidly growing new field of modern heating?

You can if you make yourself known as the man who installs Ideal Gas Boilers.

New Jobs for Old

You can offer a heating service that means replacements of existing coal fired equipment in places where you could hardly expect to get new coal jobs.

You can get business in new homes, large and small, and in larger buildings too, for Ideal Boilers range in capacity from 225 ft. to 8000 ft., steam, water vapor and vacuum systems.

No Call Backs

Best of all, the gas company relieves you of servicing, which eliminates call backs and trouble jobs.

Special low rates for house heating have already been established by many gas companies and the practice is growing. Wherever these rates are in force there is a live and active market for gas boilers. The gas companies are opening up this wonderful field with continued constructive advertising and sales promotion work.

Co-operation with Gas Companies

It's to your advantage to co-operate with the gas company in the sale and installation of Ideal Gas Boilers.

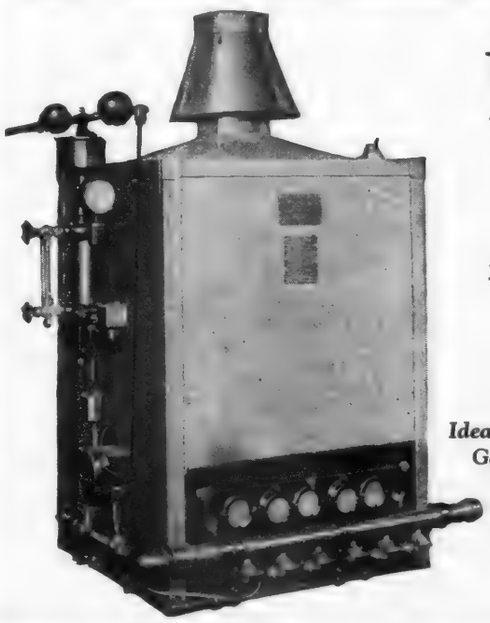
This equipment is of the same high quality which characterizes all the equipment manufactured by the American Radiator Company. It is accepted as standard by several hundred gas companies.

We have complete descriptive matter giving capacities, sizes, ratings and full information on Ideal Gas Boilers.

Send Coupon for Details

You can hardly afford not to be thoroughly posted on this new field of bigger profits for heating contractors.

Take the first step to familiarize yourself with Ideal Gas Boilers and what they can do. Clip the coupon below and send it to us today. No obligation is involved. Act now and pave the way for new profits during the next heating season.



Ideal Type 1-G Gas Boiler

IDEAL Gas Boilers

Product of the AMERICAN RADIATOR COMPANY

American Gas Products Corporation

376 Lafayette Street DISTRIBUTORS New York City

AMERICAN GAS PRODUCTS CORP.
376 Lafayette St., New York City

GENTLEMEN: Please give me further information about Gas House Heating.

Yours very truly,

Name_____

Address_____

City_____ State_____

NEW!

Minneapolis Thermostatic Control for Gas Heaters

Safe—Simple—Automatic

Here's a real achievement—the Minneapolis Gas Valve—a sure-operating valve and safety shut-off combined. It operates magnetically—no motor is necessary. Shuts off the gas flow, without fail, in case of a broken circuit or power failure.

The Minneapolis Gas Valve makes any gas heating plant more efficient, more satisfactory to the customer—and more profitable for the dealer because of simplified installation.

A product that conforms to the high Minneapolis standard. Proved right—in our laboratories and in actual service. Write us for complete information.

MINNEAPOLIS HEAT REGULATOR CO.
2804 Fourth Avenue So., Minneapolis, Minn.

A complete line of magnetic valves for use in connection with standard type Minneapolis Thermostats can also be furnished. These valves, while similar in design, do not have the automatic shut off in case of power failure.

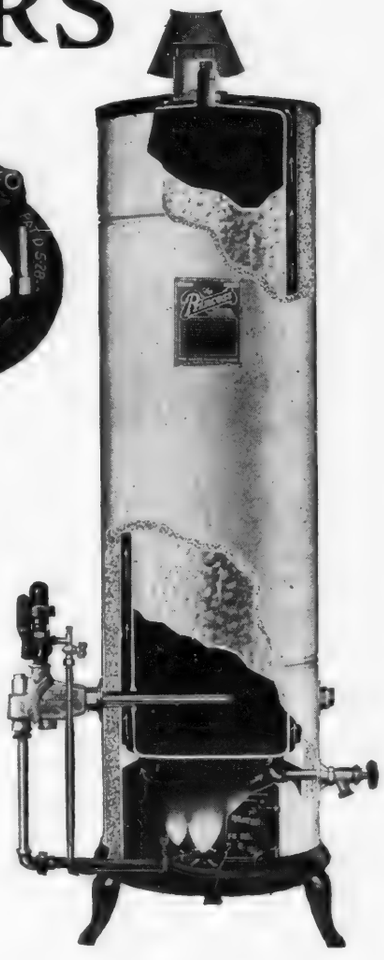
The "MINNEAPOLIS" TYPE-10 GAS VALVE

BARBER PATENTED JET GAS BURNERS

used in

The Princess REG. U.S. PAT. OFF.

Automatic Storage Heater



The Princess Automatic Storage Heater is built in four sizes to meet practically every hot water requirement when gas is available.

The Sands Manufacturing Company of Cleveland, makers of the Princess, say this of the Barber Patented Jet Gas Burner with which all sizes of the Princess are equipped: "The Barber Patented Jet Burner is acknowledged by the best authorities in gas heating, as the most efficient burner on the market. It will not back-fire or deposit carbon—requires no adjustment regardless of the quality, or pressure of gas, assuring the lowest possible gas bills."

It is self-evident that no water heater can be better than its burner. It would therefore be wasted effort to put the best of material, engineering and workmanship into a heater and use less than the most efficient burner.

Look over the list of manufacturers, at the right, who use Barber burners. It is an honor roll of water heater makers. The most prominent and reputable manufacturers in the industry are there and are indicative of the reputation that this company has as a builder of gas burners for water heaters.

Plumbers, fitters and gas companies find that one of their greatest sources of water heater trouble is entirely eliminated when they buy and sell products that have for their heating unit, Barber Patented Jet Gas Burners.

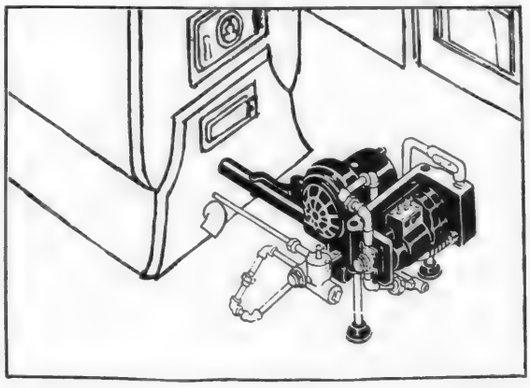
Manufacturers of gas appliances will find us ready to subject their appliances to accurate tests, in our well-equipped laboratory, at no expense to the manufacturer, in the effort to attain a greater degree of efficiency through the use of Barber Jet Burners. Tell us your problems and we will strive earnestly for a correct solution.

Write for our new Jet Burner Catalog, illustrating our newer designs and giving full information —engineering data—prices and discounts.

Among the many Heater Manufacturers who have adopted and are using "Barber Patented Jet Gas Burners" are the following:

American Radiator Co.
Barton-Roth Co.
Bastian-Morley Co.
Bryan Steam Corp.
Coast Heater Mfg. Co.
Day & Night Water Htr. Co.
Franklin Plumbing Sup. Co.
Geneva Heater Co.
Gewert Mfg. Co.
Hoffman Heater Co.
Hotstream Heater Co.
Edw. Katzinger Co.
Lovekin Water Heater Co.
The New Way Mfg. Co., Inc.
Piatt Water Heater Co.
Sands Mfg. Co.
Snap-O-Stat Co.
Southard Robertson Co.
Superbo Water Heater Co.
Superbo Mfg. Co.
Welsbach Co.
Walter Mork Heater Co.

The CLEVELAND GAS BURNER & APPLIANCE CO.
Burner Specialists
3702-04 Superior Avenue, Cleveland, Ohio



Today's trend *in heating homes*

YOU are being asked more questions about oil-burning, today, than ever before. This is to offer you a reliable file of data on the subject. This has been compiled from very broad experience in this field.

More than 27,000 American homes are Nokol-heated today. And at no time have more Nokols been installed—daily, weekly, monthly—than right now. As you may perhaps know, Nokol actually founded the automatic oil-burner industry eight years ago—today such automatic control of domestic oil burners has become standard practice.

This file of information covers every phase of Nokol performance, results and installation—in every type of building. You will find it interesting and, we believe, profitable.

Address: THE AMERICAN NOKOL COMPANY
215 N. Michigan Avenue Chicago, Ill.

NO COAL **NOKOL**
Automatic Oil Heating for Homes

Approved by all principal Safety Boards. *Manufactured and Guaranteed by* AMERICAN NOKOL COMPANY, *Chicago.*

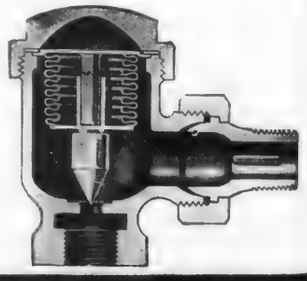
17 College Fraternities Keep Warm With

SARCO Radiator Traps

The Fraternity Clubs Building, New York, is the home of 17 college fraternity clubs, and is the most modern building of its kind. It is 17 stories and contains about 550 rooms.

In designing this handsome structure the architects, Murgatroyd & Ogden, New York, took unusual precautions to see that everything possible was done to insure utmost comfort to the guests—to insure economical operating costs and durable equipment. So Sarco Radiator Traps were used throughout.

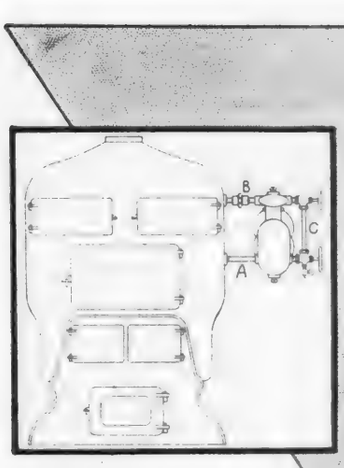
These factory-adjusted traps have unusually large discharge. They are noiseless in operation. Won't freeze or air-bind. Prevent water hammer. Are self-cleaning and easy to take apart.



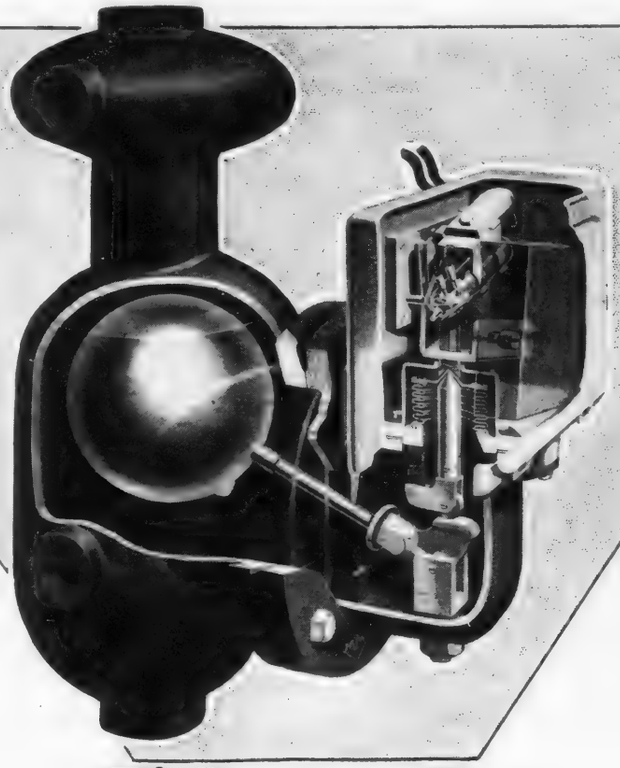
Write for Booklet P-129

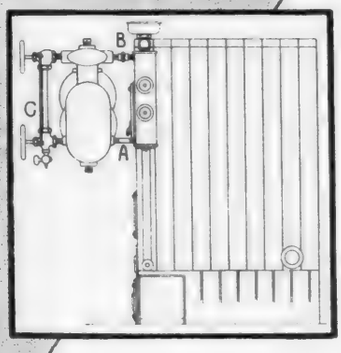
Sarco Co., Inc.
183 Madison Ave.
New York City

Boston Chicago Detroit
Buffalo Cleveland
Philadelphia



The McDonnell & Miller Duplex Switch is simple to install — install the Duplex Switch in the gauge glass tappings in the boiler and reinstall the gauge glass.





Whether the boiler has independent gauge column or has gauge glass in first section, the installation is the same. An instruction sheet is included in each shipping case.

Simple SAFETY

BY a simple combination of a float, a Sylphon Bellows and a mercury tube switch, the McDonnell & Miller Duplex Switch combines, in one unit, a dependable low water cut-off and a positive and easily regulated pressure switch.

The point of low water cut-off is definitely fixed by the design of the Duplex Switch—it cannot be improperly installed. The pressure regulation is made by means of two counter-balancing weights—one of which adjusts the point of pressure cut-out and the other of which regulates the differential between the cut-out and cut-in pressures.

The switch covers all ranges of pressure between 3 ounces and eleven pounds, and may be adjusted to operate on a differential of one pound.

There are no springs of any kind in the whole unit. It assures positive protection to oil-fired steam boilers.

McDONNELL & MILLER

Wrigley Building **Chicago**

Duplex M&M BOILER CONTROLS Switch

Low Water and Pressure

Kindly send complete information about the McDonnell & Miller Duplex Switch, together with prices and quantity discounts.

Firm.....

Address.....

City.....

By.....

☐ Oil Burner Dealer ☐ Manufacturer

"NATIONAL" BULLETIN

6th EDITION

NUMBER 6

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CORRECT PIPE THREADING PRINCIPLES

CERTAIN fundamental principles govern the results obtained in threading pipe, which should be of interest and concern to practically everyone who has anything to do with the threading of pipe.

Whether pipe is threaded by power machines or by hand-operated tools, when trouble is experienced the cause can usually be attributed to dull dies, improperly designed dies or [illegible] lubrication. Failure to study the fundamental principles of pipe threading sometimes results in placing the blame for poor threads on the material in the pipe, when the trouble can often be traced to the use of dies that have not been kept in cutting condition, or to the use of antiquated design.

It frequently happens that an individual or firm possesses equipment, which although not giving satisfactory results cannot economically be discarded. It is the purpose of this bulletin to suggest how such dies may be brought up to present day standards by a few simple alterations.

Use the Coupon for Your Copy of this Bulletin

Fig. 1—Rough threads cut with old-style die. Note the crumbling chips in contrast with those shown in Fig. 2

Fig. 2—Clean, strong threads cut with properly ground die. Note characteristic spiral chips of correct cutting action

NATIONAL TUBE COMPANY General Sales Offices FRICK BUILDING PITTSBURGH, PA.

Please send Bulletin No. 6-Correct Pipe Threading Principles-to

Name .....

Address .....

.....

RAYFIELD

PATENTS PENDING

Automatic Fuel Oil Burners

Possess the practical features demanded by Heating Engineers

IN heating boilers and furnaces designed to burn coal the application of the maximum heat is at the bottom of the fire box. There is also a bed of coals to radiate heat during the periods of low fire. These are sound, well established engineering principles, and it is obvious that an oil burner must meet these conditions in order to produce the best results. Both of these principles are incorporated in the Rayfield Automatic Fuel Oil Burner and it is the only domestic oil burner we know of that fully utilizes the Radiant Heat principle.

Rayfield's Scientific Combustion

Note the illustration. The nozzle is suspended over the fire pot. The vapor, burning in suspension, is forced directly downward to the crushed fire brick at the bottom, then deflected to the sides and rises evenly along the walls of the fire box before the generated heat escapes through the flue. In this manner the flame travels twice the usual distance in the fire box, giving off the maximum heat at the bottom of the fire box and completing combustion before reaching the flue.

The Radiant Heat principle is utilized through the bed of crushed fire brick placed in the ash pit. In operation this brick quickly becomes incandescent, absorbing and holding the heat that would otherwise be lost up the chimney. Long after the burner has been shut off by the thermostat, this white-hot bed of crushed brick continues to radiate its stored heat and thus assists in maintaining an even temperature throughout the building.

For Steam, Vapor Hot Water, Hot Air

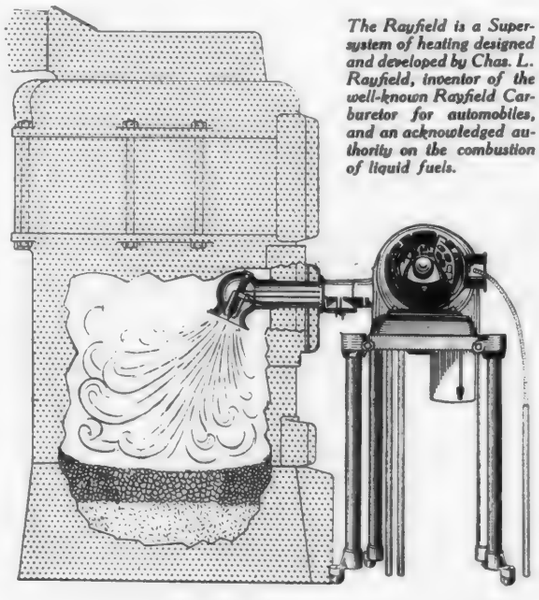
The Rayfield is fully automatic and operates successfully in any good heating plant. It comes in various sizes and has had three years of practical tests in homes, apartments, theatres and factories.

You have been waiting a long time for this scientific oil burner —a burner that you would readily install in your own home after seeing a demonstration.

Our Facilities and Organization

Our large plant is equipped with foundry, modern machinery, testing and assembly departments—everything necessary for economical and quantity production.

The same organization that produced the well-known Rayfield Carburetor is behind the Rayfield Oil Burner. Our reputation and responsibility are too well known to require further comment.



The Rayfield is a Supersystem of heating designed and developed by Chas. L. Rayfield, inventor of the well-known Rayfield Carburetor for automobiles, and an acknowledged authority on the combustion of liquid fuels.

Rayfield Burns 28°-30° Fuel Oil

This grade of Fuel Oil is lower in cost and higher in heat units than the lighter oils. We burn it as clean as illuminating gas—no smoke, no carbon, no residue and no odor. The Rayfield can burn the lighter oils but they are not so economical.

4 Important Features

that appeal to Heating Engineers

1. Utilizes the Radiant Heat Principle.
2. Positive Electric Ignition.
3. Air-cooled, Non-carbonizing Nozzle.
4. Triple Atomization.

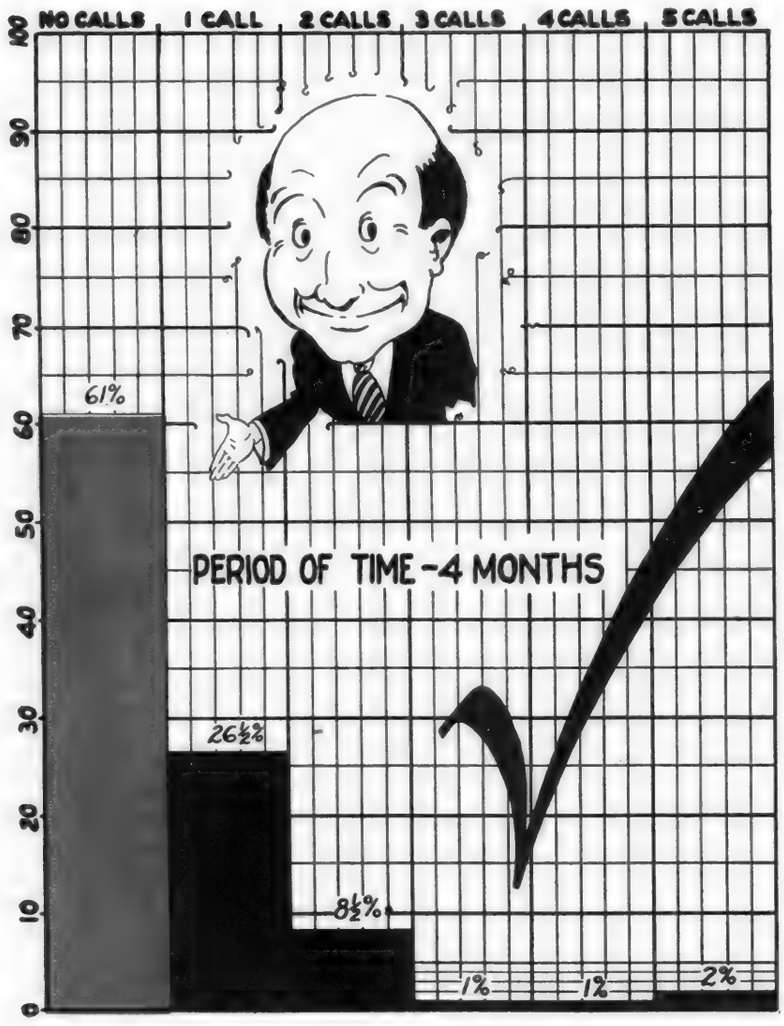
Send for illustrated circular.

Rayfield Mfg. Co.

21st and Rockwell Sts., CHICAGO

Contractor-Dealers Wanted

The Rayfield franchise will appeal to men who know the heating business. A profitable connection is offered responsible parties who are prepared to demonstrate, sell and install our equipment. Write for territory and further particulars.



An ABC

Dealer's Service call record

61% of Burners—No Calls
21½% of Burners—One Call
8½% of Burners—Two Calls

The other calls the dealer classifies as "chronics"—No oil, etc.

Few Service calls— that's one reason why ABC dealers make money

More than one oil burner dealer knows that it is one thing to sell oil burners—but another thing to service them.

ABC is simple—only one moving part that can wear. Service calls are low. Profits are certain.

Listed as Standard by Underwriters' Laboratories

AUTOMATIC BURNER CORPORATION
312 N. May Street, Chicago

ABC OIL BURNER

no noise ~ no carbon

HOME IS WHERE THE HART IS

The Selling Power of Insistent Suggestion

Lots of people are now ready for oil burners. They would buy oil burners if made to realize the benefits of a modern heating system.

Why not help your business by pointing out to them the convenience, cleanliness, thrift and security of the Hart Oil Burner? One dealer in a Chicago suburb sold three in one week by using the telephone.

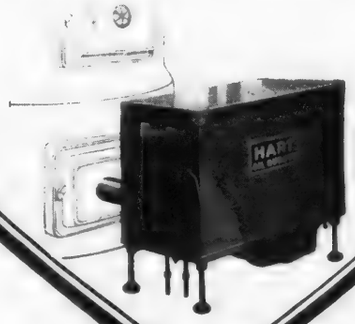
The kind of people who buy oil burners are, for the most part, far-sighted and forehanded. They don't wait until November to get ready for winter.

That's why you can sell them Hart Oil Burners now. Only $50 upon installation and nothing more to pay until October 1. That's the way to make hay in May. The Hart Oil Burner, in combination with Hart Electric Icer, means year round profits from year round sales.

By reason of superior design and construction, the Hart equipment is preferred by countless engineers. Endorsed as standard by Underwriters' Laboratories, Inc. Perhaps you'd like to represent Hart in your locality. If so, we'd like to send full information.

W. B. WILDE CO., *Peoria,* Illinois

Some desirable openings still exist for desirable dealers. Send for booklet



Hart Electric Icer. A highly developed iceless refrigerator for the home

HART OIL BURNER

W. B. WILDE CO.
2135 North Adams Street
Peoria, Illinois

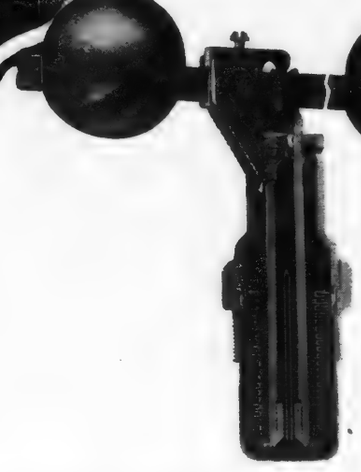
You may send me, without cost or obligation, your latest booklet on Oil Heating.

Name .....

Street .....

City ..... State .....

Why?



ARCO WATER REGULATOR
Stock No. 800

HERE ARE THE ANSWERS to questions you might ask about automatic regulation of hot water heating jobs.

? *Why do the big "system" companies use water regulators as standard equipment?*

Because the specialist in hot water heating knows that automatic regulation is necessary to the perfect performance of a hot water plant—and he recognizes that the owner is entitled to this refinement.

? *How about the owner? Is he getting his money's worth?*

It's the cheapest thing he can buy—because it saves him thousands of needless trips to the basement. And, incidentally, it saves you many expensive service calls to owners who do not know how to handle dampers by hand.

? *Why can't an owner run his plant just as efficiently with manual control?*

Because men forget—and a good automatic regulator never forgets—never sleeps.

? *How can I include a water regulator in my bid without hurting my chances on a competitive job?*

By telling the owner that you are giving him something the other fellow isn't giving him—something that will relieve him of the annoyance of fussing with dampers.

This puts you in a "preference" class—and enables you to increase your profit without materially increasing your investment.

The ARCO WATER REGULATOR is guaranteed by the world's largest makers of heating equipment

AMERICAN RADIATOR COMPANY

816 S. Michigan Ave., Chicago, Ill.

ARCO water regulator

Take a lesson from the clothing merchant—

The clothing merchant keeps busy year 'round because he meets seasonal demands. He couldn't sell the same goods summer and winter.

Why not do this in your business? Meet seasonal demands with real leaders and you'll make greater profits.

OUR DOUBLE FRANCHISE

Opens 3 Big Sales Fields

With our double franchise for the Combustion Fuel Oil Burner and Milwaukee Air Power Water System, dealers eliminate quiet seasons. Here are two proved leaders, big sellers, money-makers. The quiet months on one are the busy months on the other.

The nozzle-type Combustion Oil Burner is adaptable to both domestic and industrial heating. Two big sales outlets. Burns genuine fuel oil, yet is completely automatic. Simple. Dependable. Easy to install. Flexible, adaptable to any building or group of buildings. Many other sales clinching features. A big success for over 6 years. Thousands in use from coast to coast.

The Milwaukee Air Power Water System supplies water direct-from-source. Gives complete water service—hard, soft, hot, cold water. The only system with the famous double cylinder air power pump. Over 25,000 in use.

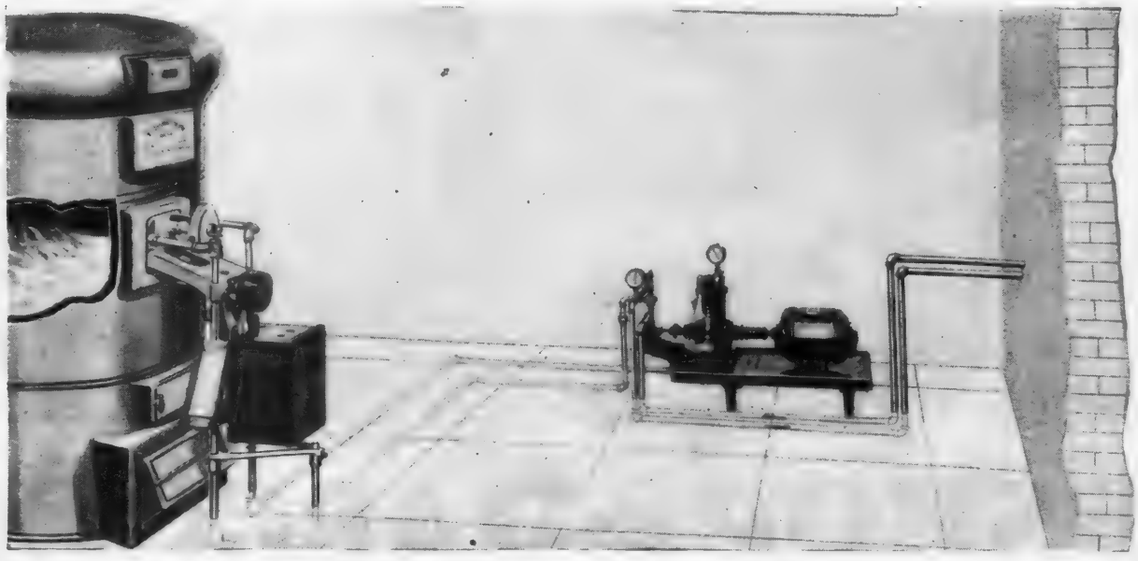
Start now with these two proved money makers. Bring year 'round balance to your business. Write today for complete information.

COMBUSTION FUEL OIL BURNER CO.
13 Keefe Ave. Milwaukee, Wis.
Subsidiary of Milwaukee Air Power Pump Co.

The Combustion Fuel Oil Burner

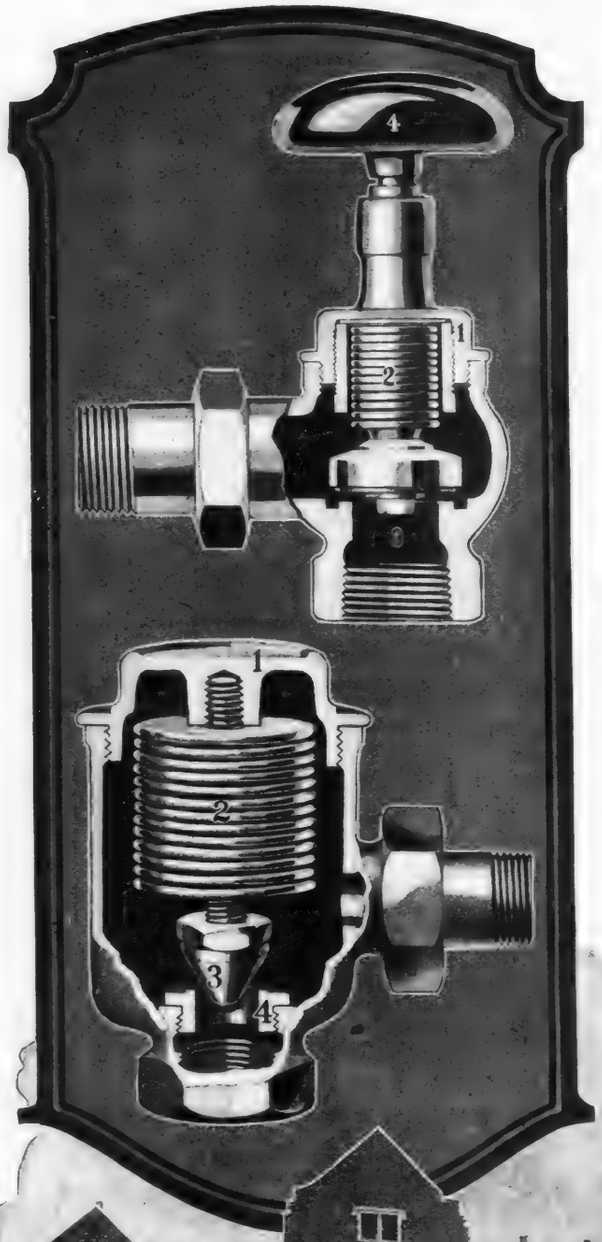
Outstanding Sales Features

1. A truly automatic system burning genuine fuel oil. Suitable for domestic or industrial use. Nozzle type—the same principle used in steel mills and by U. S. Navy for many years. Insures utmost atomization and combustion.
2. Manufactured since 1919. Thousands in use all over the country. A safe dependable burner.
3. Quiet in operation.
4. No smoke, dirt or odor when properly adjusted. No labor required.
5. Many less parts than any other completely automatic oil burner; only 3 moving parts—motor, compressor, oil pump.
6. Automatically self-lubricating.
7. No complicated clock mechanism, gears, cams, levers, rods or drip cans.
8. No alteration to boiler or furnace required.
9. Flooding with oil is impossible. Perfect control of fuel; flows only when needed.
10. Oil flow is governed by air or pump pressure. Stops when motor stops.
11. Very low pressure is required. Perfect control, high pressure impossible.
12. Built with pump unit or with service tank. Tank, motor and pump can be installed in any convenient part of basement. Gas or electric ignition, economizer provided on all gas fired units.
13. All pipes are small and may be installed under the concrete floor.
14. Insures a high degree of heating efficiency.
15. Listed as Standard by the Underwriters' Laboratories.



Installation of Combustion Fuel Oil Burner Pump unit type

A Typical Installation



IN the St. Mary's College, South Bend, Indiana, Bishop & Babcock packless Multiflex valves and No. 3 Multiflex traps were selected for use. Selection of this equipment was based on satisfactory past performance, made possible by long years of manufacturing experience and unexcelled facilities for production of products in this class.

The trade mark "Multiflex" on heating specialties is an assurance of satisfactory service.

Multiflex Valves

No. 1—Cap and Body heavy bronze castings. Metal to metal joints.

No. 2—Multiflex Bellows forming packless wall. Absolutely packless.

No. 3—Large Port in valve through which steam passes.

No. 4—Two Turns of handle fully opens or closes the valve.

Multiflex Traps

No. 1—Body and Cover of Multiflex Return Trap are heavy brass castings, metal-to-metal joints.

No. 2—Thermal Member is seamless one-piece Multiflex metal bellows.

No. 3—Conical Valve always insures positive seating. Made of the best steam brass.

No. 4—Brass Seat has sharp edge, prevents accumulation of dirt and scale. Seat is renewable.

THE BISHOP & BABCOCK SALES CO.
General Offices CLEVELAND, OHIO

GILHAM, COOK & WHITE, *Engineers*
Kansas City, Mo.

J. E. HANEY, *Heating Contractor*
South Bend, Indiana

BISHOP & BABCOCK
HEATING SPECIALTIES

ENGINEERED TO A STANDARD

BUILT COMPLETE AT THE FACTORY

AGAIN

in 1925, as in 1924 and in 1923, more Kleen-Heets were installed in the home of the oil burner industry—Chicago—than burners of any other make. Another tribute to unfailing performance!

Some desirable territory is still available for dealers. Write or wire for profit-making proposition!

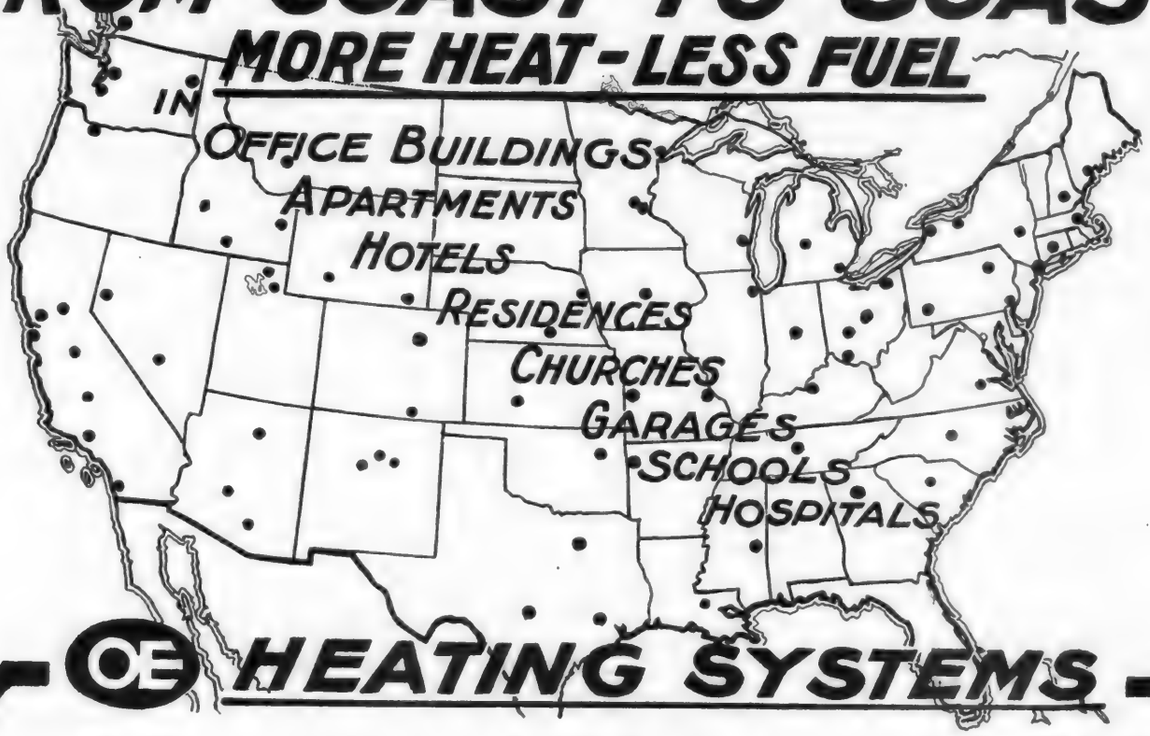
WINSLOW BOILER AND ENGINEERING COMPANY
208 South La Salle Street, Chicago

KLEEN-HEET *With* Oil

TESTED AND LISTED AS STANDARD BY THE UNDERWRITERS' LABORATORIES.

FROM COAST TO COAST

MORE HEAT - LESS FUEL



O-E HEATING SYSTEMS

"O-E". Improved. Perfect Packless Graduated Valve.

"O-E" Improved Air Exhauster and Vacuum Valve.

"O-E" Perfect Ball-Check Water Seal Union Elbow with Adjustable Air Vent.

A few O-E Installations in Los Angeles

"O-E" INSTALLATIONS WILL BE FOUND IN

New York	Atlanta
Boston	Nashville
Hartford	Meridian, Miss.
Buffalo	Louisville, Ky.
Scranton	Cincinnati
Pittsburgh	Columbus
Cleveland	Dayton
Detroit	Indianapolis
Chicago	St. Louis
Milwaukee	Kansas City
Minneapolis	Omaha
St. Paul	Denver
Duluth	Lincoln
San Francisco	Ft. Smith
Oakland	Dallas
Los Angeles	San Antonio
Seattle	Houston
Spokane	Boise, Idaho
Portland	Helena
Vancouver, B.C.	Salt Lake City

In Foreign Localities Including Japan and China

O-E SPECIALTY MFG. CO.

NO. 5 SERIES OF COAST TO COAST INSTALLATIONS ~

MILWAUKEE, U.S.A.

Let's Sidetrack Superlatives and Deal with *Facts*

And here are the facts:

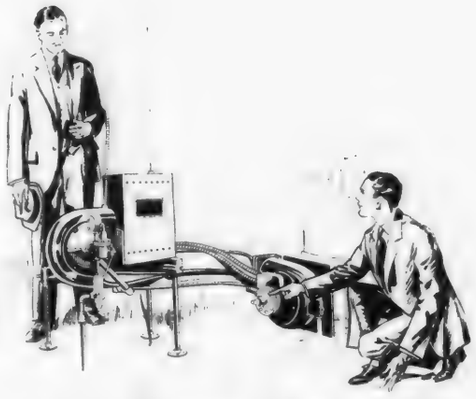
The designers of the Electrol Automatic Oil Burner were pioneers in oil burner engineering who developed to a high degree two elements of a successful automatic oil burner:

(1) Automatic Electric Ignition.
(2) A Master Control.

In the Electrol ignition is by electricity—direct—positive — and automatic. A single motor of only 1/10 H.P. operates the burner. No gas pilot light, nor is there needed any other intermittent means of preheating the oil.

A Master Control, that is all but human, co-ordinates and unifies the action of the burner's various parts.

An 8-day clock thermostat controls the burner, day and night, according to the needs.



And the Electrol is *quiet.* No more sound than the soft purr of an electric fan.

Years of successful service in thousands of homes and buildings of every type demonstrate its dependability. It is one of the most popular oil burners in America.

The rapid growth of the oil burner industry is broadening the market and the opportunities for men with sufficient capital and capacity. It will pay you to consider handling the distribution of the Electrol in your territory.

HOME APPLIANCE CORPORATION . . . . . ST. LOUIS, U. S. A.

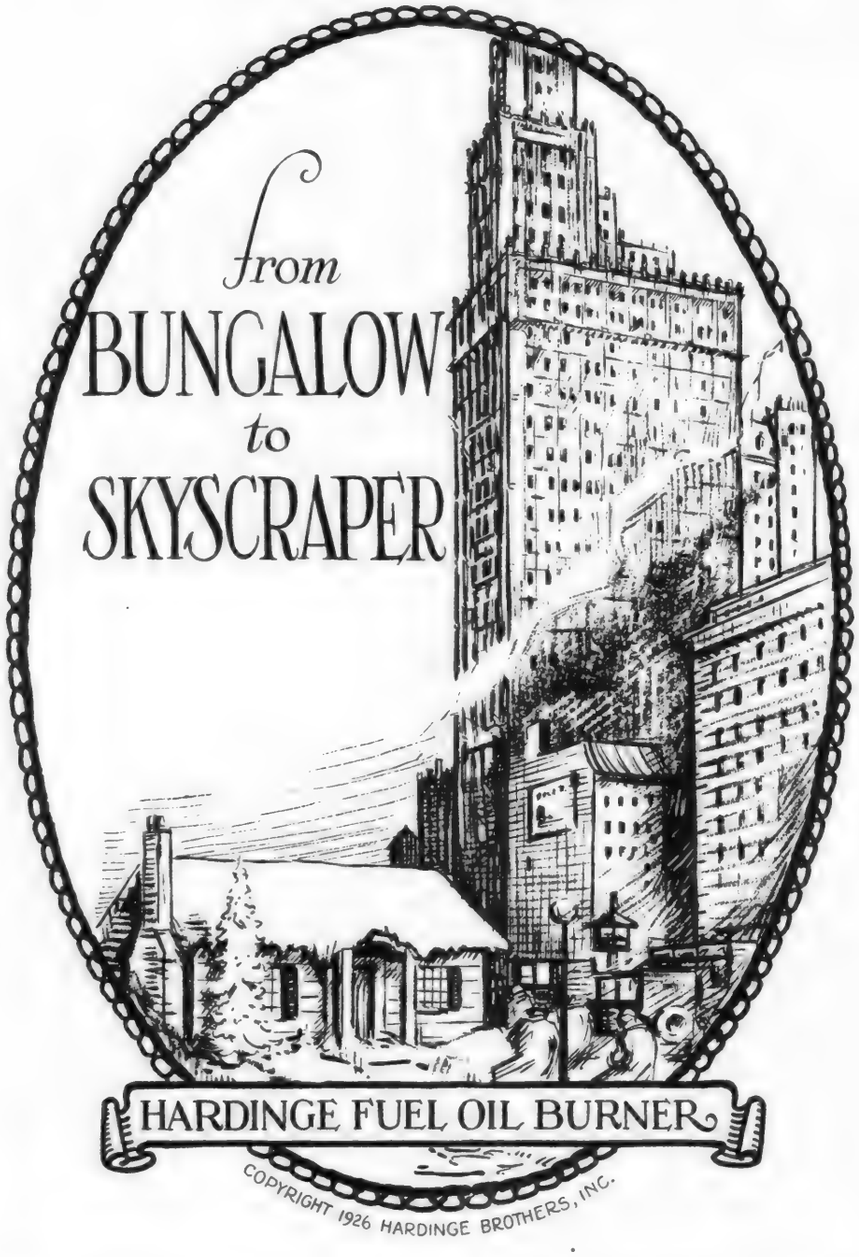
(Scott-Newcomb System)

ELECTROL

Electric Ignition Quiet Operation

AN AUTOMATIC OIL BURNER

HARDINGE

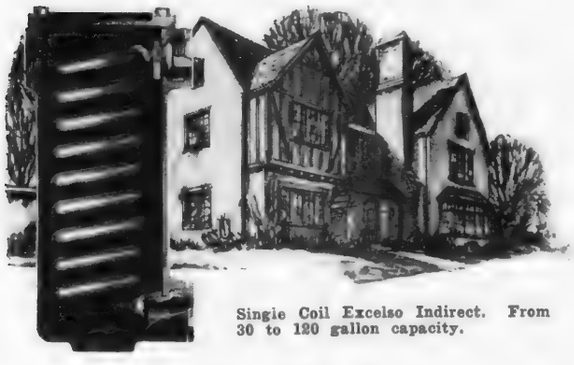


We invite correspondence from responsible dealers in the heating industry. The ten-year guarantee covering every Hardinge burner is your definite assurance that this machine will give faithful performance to your customer and the utmost satisfaction to you.

Guaranteed for ten years. Both domestic and industrial Burners approved by the Underwriters' Laboratories. Economical and practically noiseless. Safe and dependable. Supplied in a wide range of sizes—"Bungalow to Skyscraper." Manufactured by Hardinge Brothers, Inc., whose name and products are known throughout the world, and who stand solidly back of the oil burner bearing their name.

Hardinge Brothers, Inc., 4149 Ravenswood Ave., Chicago

Sizes for One Family or One Hundred Families



Single Coil Excelso Indirect. From 30 to 120 gallon capacity.

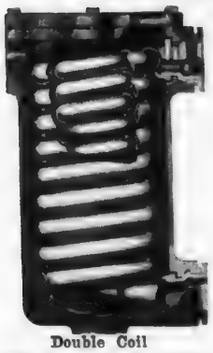
The Excelso Triple Coil Heater is being specified for many large buildings. Capacities of individual heaters are 600 and 800 gals. May be used in batteries for larger requirements.

EXCELSO Indirect Water Heater Meets All Requirements

THERE is a size and style of the Excelso Indirect Heater for any tank from 30 to 800 gals. and larger.

It successfully uses the fire that warms the home or building to heat a plentiful supply of hot water.

It eliminates leaky, clogging fire pot coils and allows the fire to burn with full efficiency. Approved and sold by boiler and radiator manufacturers.



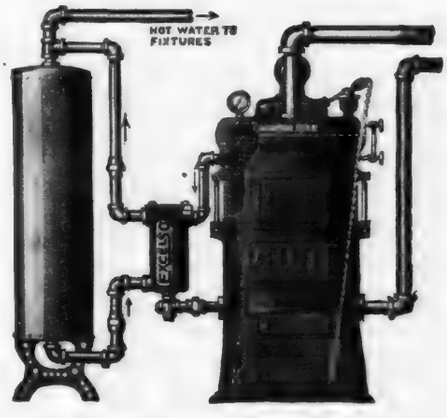
Double Coil
For steam and vapor heating plants where capacities run from 160 to 400 gals.

Specify the installation of the *original* nationally advertised Excelso Indirect Heater. Send for chart of typical installations.

EXCELSO SPECIALTY WORKS, Inc.

59 Clyde Avenue, Buffalo, N. Y.

210 E. 45th Street NEW YORK, N. Y.
32 Oliver BOSTON, MASS.
5939 Haverford Ave. PHILADELPHIA, PA.



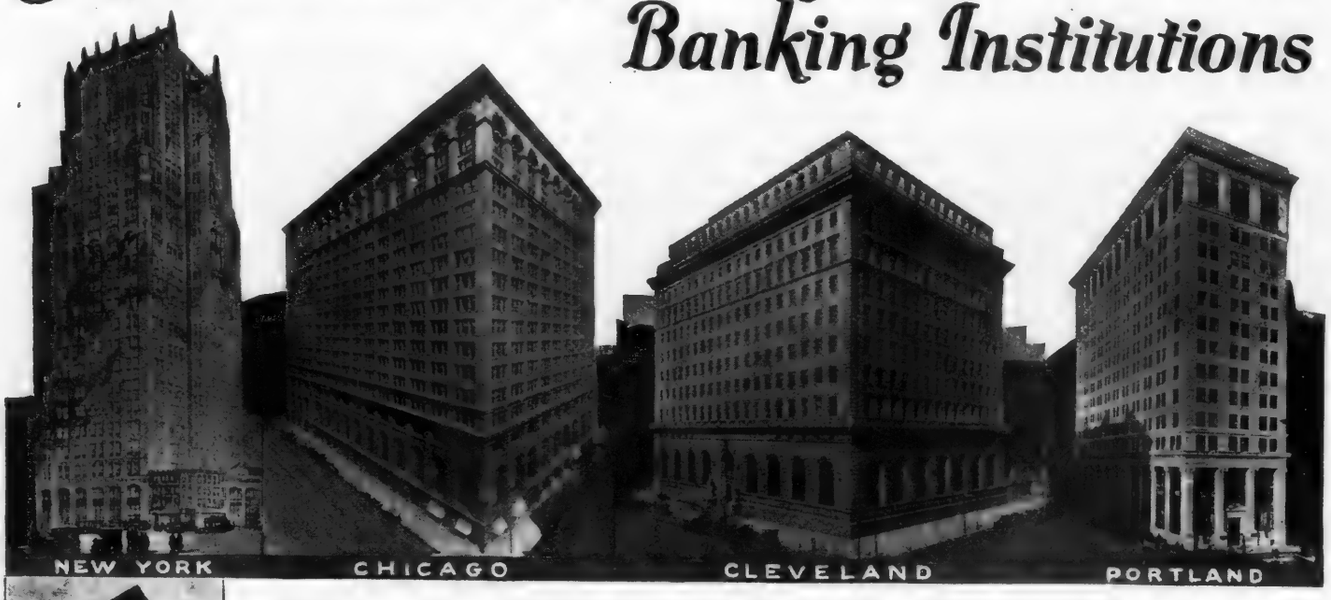
The Excelso Indirect connects to outside of steam or vapor heating boiler. Installation easily made using present pipes and fittings.

Nationally Distributed by Leading Jobbers and Boiler and Radiator Manufacturers.

EXCELSO WATER HEATERS

Sold by All Plumbers and Steamfitters

A National Skyline of Dunhamized Banking Institutions



Lexington, Ky.

Memphis, Tenn.

Salt Lake City

Birmingham, Ala.

FROM Coast to Coast, Financial Institutions, both great and small, are served by Dunham Systems of Heating. The banks illustrated on this page are scattered from New York to Oregon and from Texas to Minnesota. These banks, as well as many others not here shown, bear silent testimony to Dunham dependability, functioning with universal satisfaction in the varying climates prevailing in the United States.

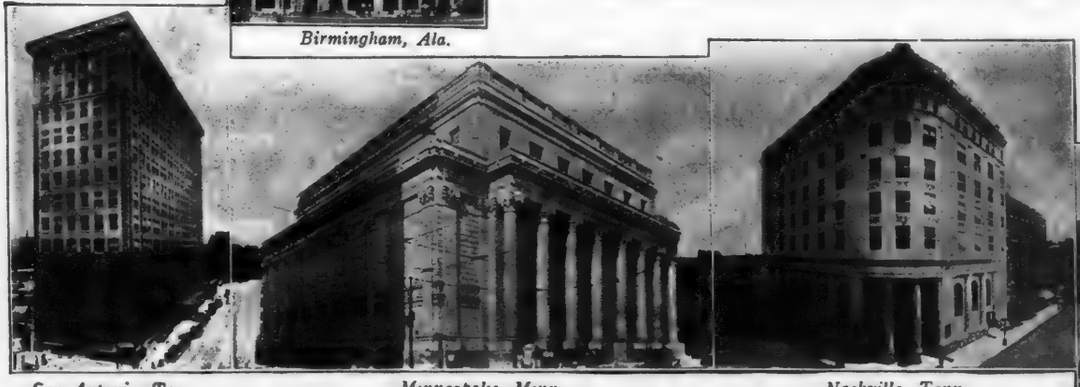
There is something about Dunham dependability and the unvarying satisfaction which results from a Dunham installation that appeals to the conservatism of the banker no less strongly than to the practical mind of the architect or of the consulting engineer. He knows that only proved merit over a long period of years could account for the nation-wide reputation won by Dunham during more than two decades of heating service in all types of structures.

Top: Gotham National, New York; 1st National, Chicago; Federal Reserve, Cleveland; Northwestern National, Portland, Ore. Side: Fayette National, Lexington; Union & Planters, Memphis; Deseret Bank, Salt Lake City; Bankers Bond Building, Birmingham. Bottom: City National, San Antonio; Federal Reserve, Minneapolis; 4th & 1st National, Nashville; Marshalltown State Bank.

C. A. DUNHAM COMPANY
DUNHAM BUILDING
450 East Ohio Street, Chicago

Over sixty branch and local sales offices in the United States and Canada bring Dunham Heating as close to your office as your telephone. Consult your telephone directory for the address of our office in your city.

DUNHAM HEATING SERVICE



San Antonio, Tex. *Minneapolis, Minn.* *Nashville, Tenn.*

Marshalltown, Ia.

An ell of the beautiful Vincent Astor Residence at Port Washington, L. I. Barnes & Jones equipped.

Delano & Aldrich
Architects

Offner & McKnight
Engineers

Teran-Lange, Inc.
Heating Contractors

Heating Homes

With Over Twenty-five Years of Experience

EVIDENT in the successful operation of every Barnes & Jones installation; evident in the genuine satisfaction which is built into every piece of Barnes & Jones apparatus, is the knowledge we have gained in our long experience in making heating equipment for homes.

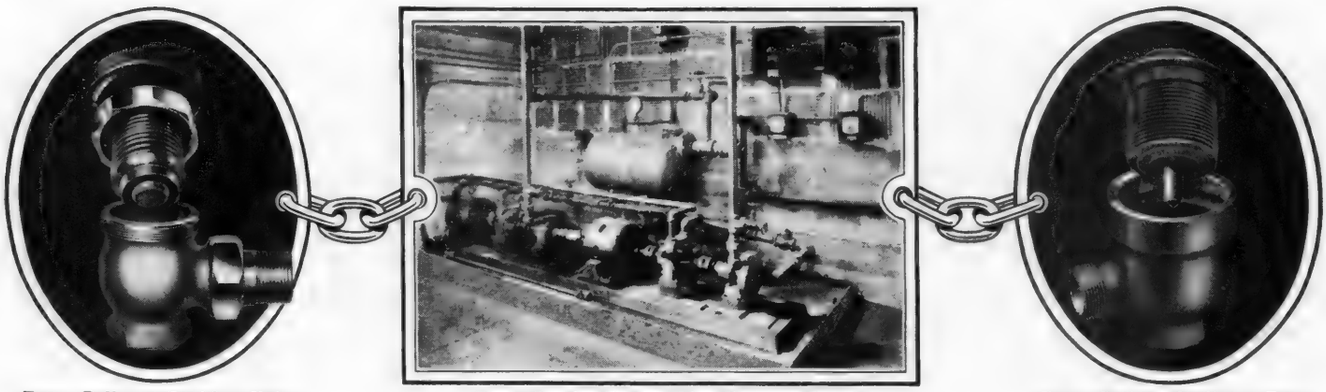
WHETHER it be in pretentious homes like those of Vincent Astor on Long Island, Rush Sturgis at Providence, R. I., Robert F. Herrick at Milton, Mass., or in many more modest homes throughout the country in which our heating systems are in use, the architect, engineer, builder or owner is always certain that absolute satisfaction can be the only result to follow proper installation of Barnes & Jones Heating Equipment of Proven Quality.

Barnes & Jones

Representatives in all Large Cities

5 Melrose Street ***Boston, Massachusetts***

HEATING SYSTEMS of PROVEN QUALITY



Trane Bellows—Packless Valve *Trane Duplex Return Line Vacuum Pump* *Trane Bellows Radiator Trap*

Think over this Undivided Responsibility idea. Trane has made it *mean* something

The Sacred Heart Buildings are shown below. Thomas F. Ellerbe and Company, St. Paul, were the architects; James Conroy, St. Paul, was the heating contractor.

This advertisement is No. 2 of the Trane Undivided Responsibility Series.

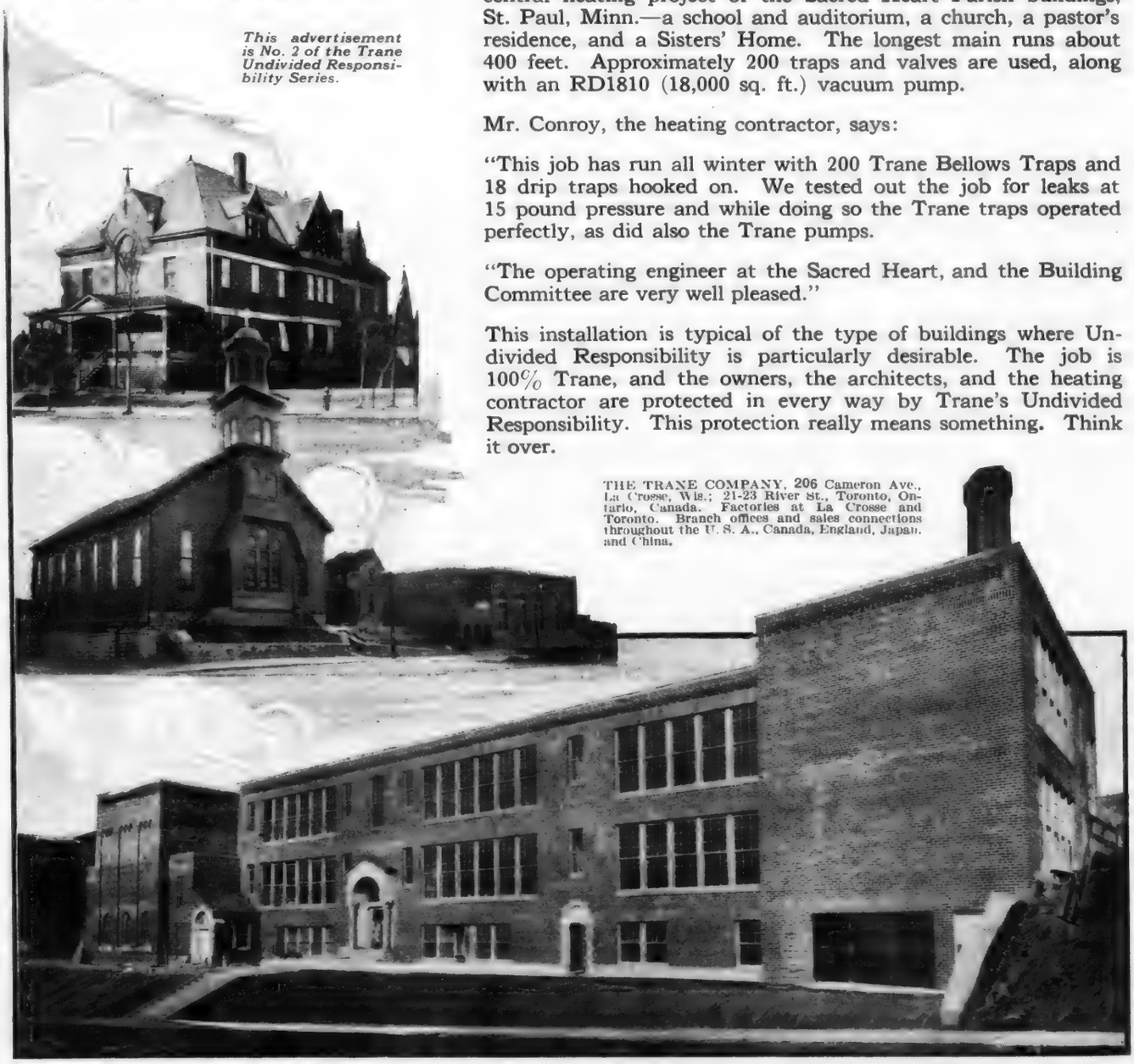
There are four buildings at the present time included in the central heating project of the Sacred Heart Parish buildings, St. Paul, Minn.—a school and auditorium, a church, a pastor's residence, and a Sisters' Home. The longest main runs about 400 feet. Approximately 200 traps and valves are used, along with an RD1810 (18,000 sq. ft.) vacuum pump.

Mr. Conroy, the heating contractor, says:

"This job has run all winter with 200 Trane Bellows Traps and 18 drip traps hooked on. We tested out the job for leaks at 15 pound pressure and while doing so the Trane traps operated perfectly, as did also the Trane pumps.

"The operating engineer at the Sacred Heart, and the Building Committee are very well pleased."

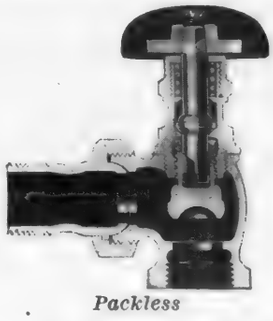
This installation is typical of the type of buildings where Undivided Responsibility is particularly desirable. The job is 100% Trane, and the owners, the architects, and the heating contractor are protected in every way by Trane's Undivided Responsibility. This protection really means something. Think it over.



THE TRANE COMPANY, 206 Cameron Ave., La Crosse, Wis.; 21-23 River St., Toronto, Ontario, Canada. Factories at La Crosse and Toronto. Branch offices and sales connections throughout the U. S. A., Canada, England, Japan, and China.

Marsh Re-enforced Packless Water Radiator Valves

Oval Wheel or Lock Shield



Packless

A Genuine Packless Water Valve Guaranteed to hold any pressure required for forced circulation

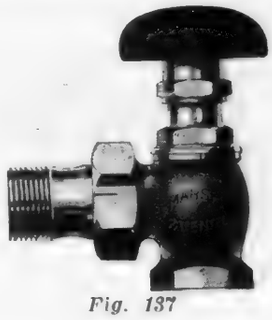


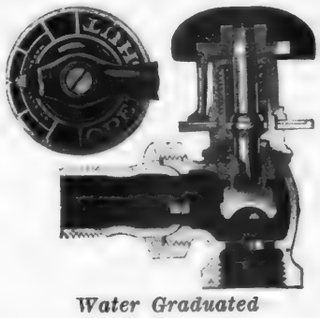
Fig. 137

Marsh re-enforced packless Hot Water Radiator Valves are not only a boon but the answer to hot water heating problems, permitting the same ease of operation and complete temperature control as with steam.

These hot water valves are quick opening, can be operated—opened and closed—with perfect ease by a child and **positively will not stick or leak.**

They will hold high pressure suitable for forced circulation up to any pressure radiation will stand, and cost no more than the cheap competition valves.

Marsh Re-enforced Graduated Water Radiator Valves



Water Graduated

Oval Wheel, Lever Handle or Lock Shield

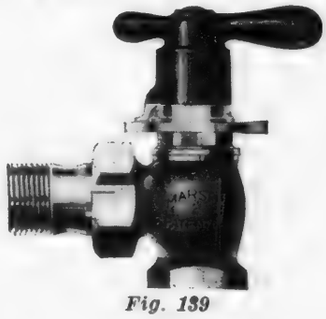


Fig. 139

Something Entirely New in Water Heat Regulation

We have made a special study of hot water heat regulation and control and are pioneers in the matter of individual radiator control, through a graduated valve, employing the same principle as with steam. If you can modulate, graduate, or regulate individual radiator vapor or vacuum steam heat, through a valve, **(and you can)**, then why not by the same principle regulate water heat.

For sleeping rooms, heat regulation with the **Marsh Graduated water valves may be controlled with the same ease of operation** and **certainty of results as is possible with a Modulated valve on a steam system,** and at a much less cost than for a vapor or vacuum system installation.

Further, water circulation for each radiator, graduating for same or balancing of system, can be increased from nothing to full pipe capacity and held or locked at any intermediate point, if desired, by simply turning dial so that stop on same will register against indicator or pointer and locking dial in this position, preventing further opening of valve or turning of wheel or lever handle to the left.

These valves cost but little more than our regular water valves and much less than steam modulated valves.

MARSH VALVE COMPANY

DUNKIRK ***Exclusive Sale Distributors*** **NEW YORK**

Edward T. Hetherington
1718 Sansom St., Philadelphia

Appleton & Liptrott, Inc.
1480 Broadway, New York

John W. Mabbs,
431 So. Dearborn St., Chicago, Ill.

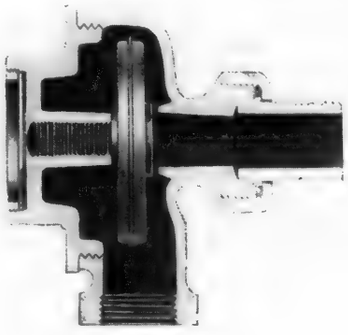
United States Radiator Corp'n
General Offices: Detroit, Mich.

All territory east of west lines of Michigan and Ohio and north of Virginia, except New York and Philadelphia.

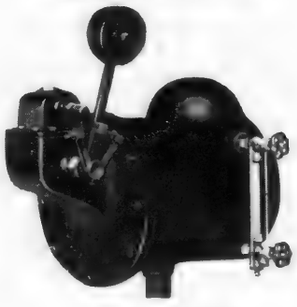
Jas. P. Marsh & Company
118 So. Clinton St., Chicago, Ill.

All territory south of Ohio River and west of Michigan and Ohio, except Cook County, "Chicago, Illinois."

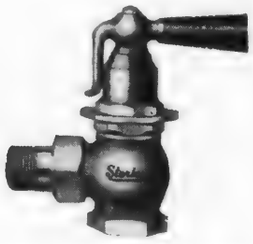
Sterlco
TRADE MARK



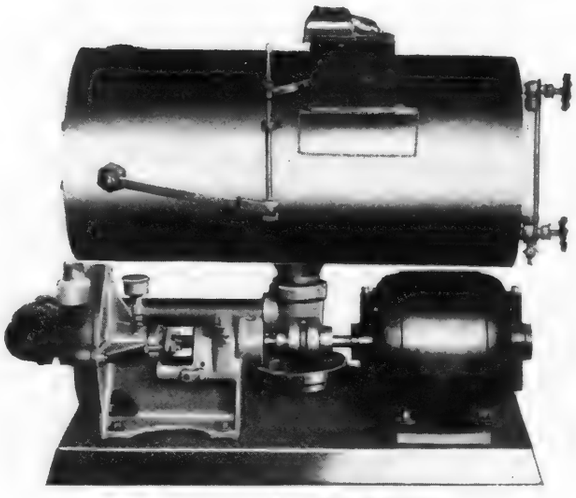
THERMOSTATIC
RADIATOR TRAP



SLIDE VALVE
RETURN TRAP



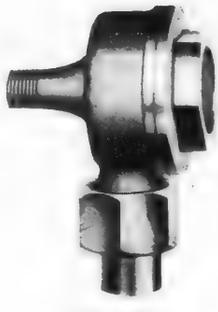
GRADUATED PACKLESS
RADIATOR VALVE



CONDENSATION PUMP
AND RECEIVER

AIR ELIMINATOR
(Vapor Type)

The Sterlco Line
of Heating Specialties
The Result of 10 Years
of Manufacturing Experience



AIR LINE
VALVE

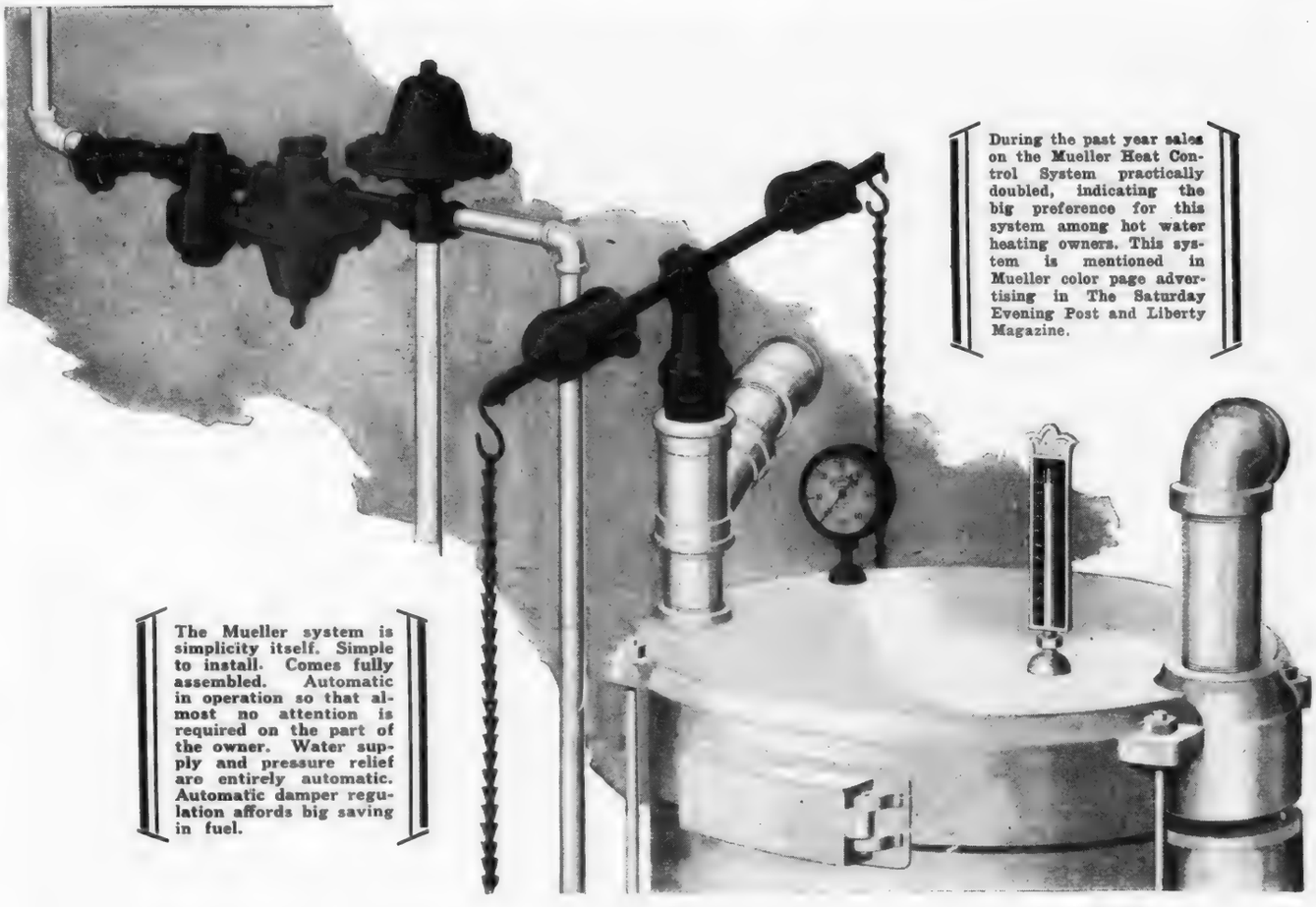
Write for Bulletins 36-37-38

STERLING ENGINEERING COMPANY

1626-44 Holton Street

Milwaukee Wisconsin

REPRESENTATIVES IN ALL LARGE CITIES



During the past year sales on the Mueller Heat Control System practically doubled, indicating the big preference for this system among hot water heating owners. This system is mentioned in Mueller color page advertising in The Saturday Evening Post and Liberty Magazine.

The Mueller system is simplicity itself. Simple to install. Comes fully assembled. Automatic in operation so that almost no attention is required on the part of the owner. Water supply and pressure relief are entirely automatic. Automatic damper regulation affords big saving in fuel.

MUELLER Heat Control System

Simplified heat control for hot water heating

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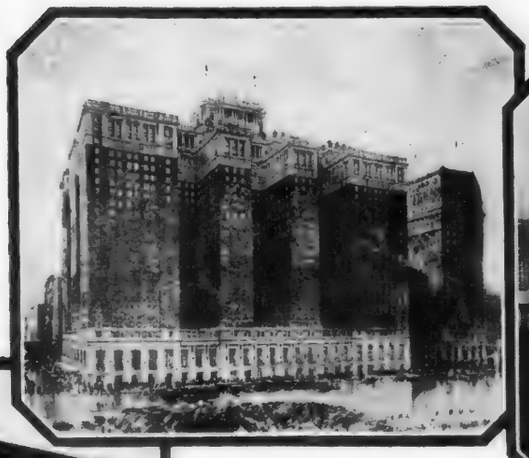
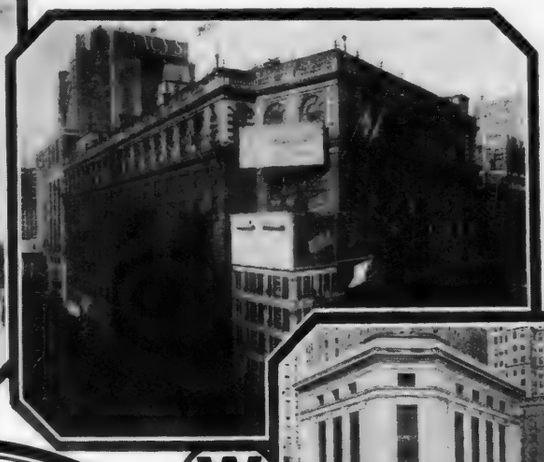
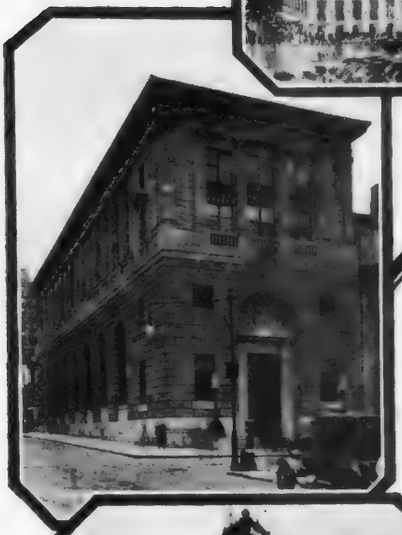
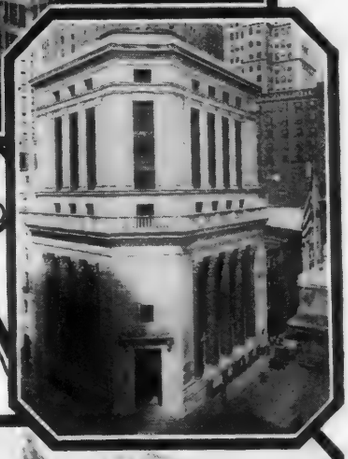

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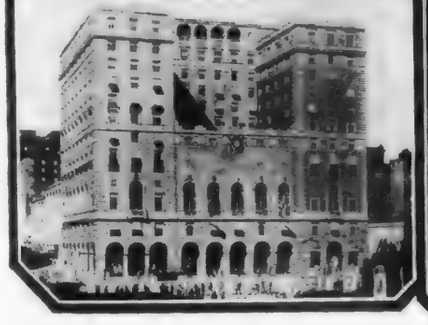

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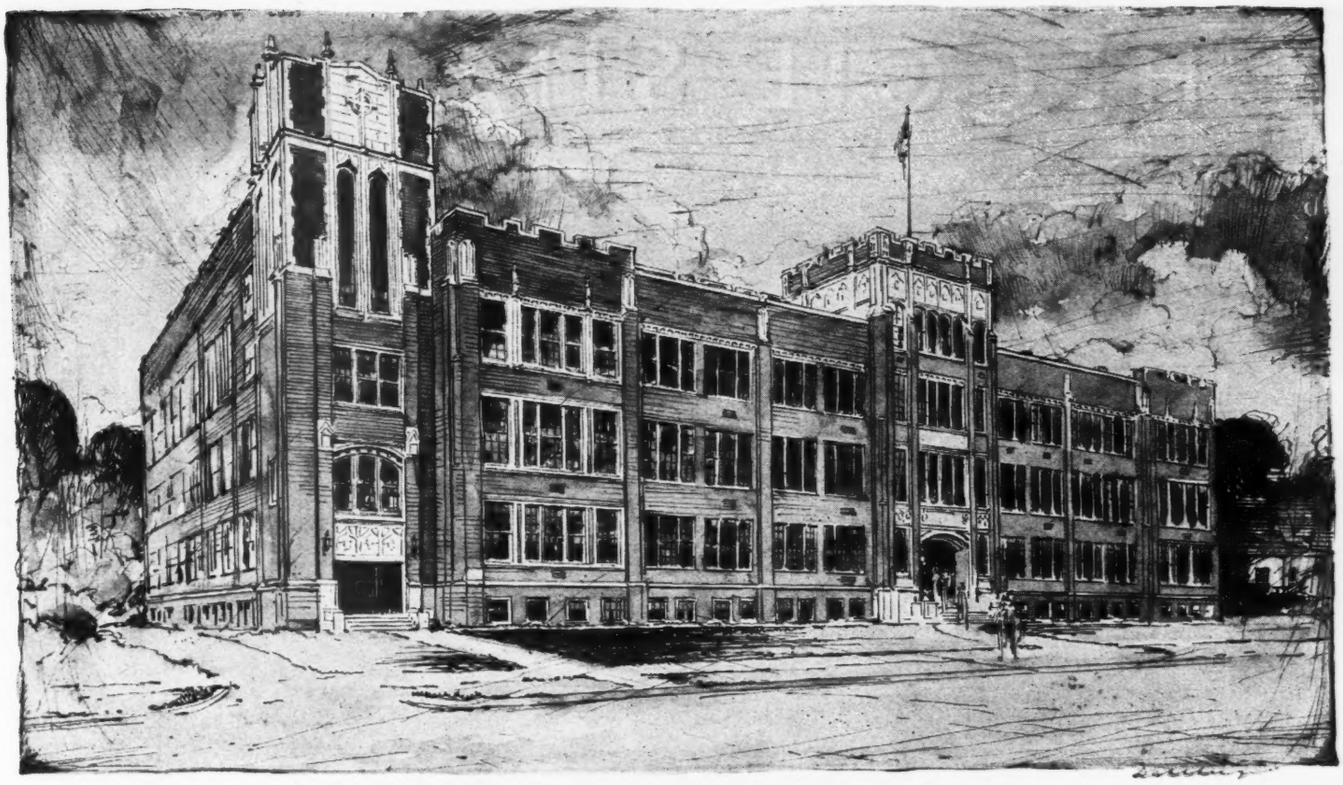

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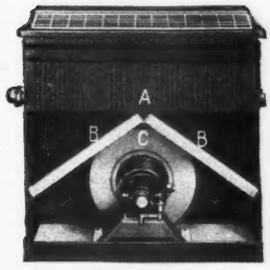

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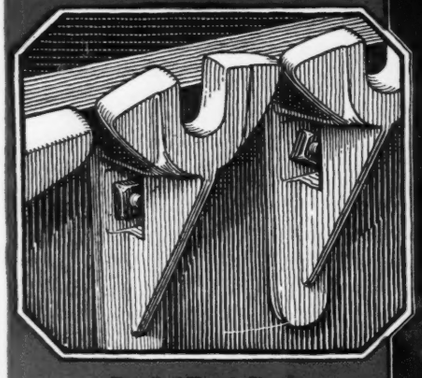

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The Heating and Ventilating Magazine

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